McGraw-Hill DIGEST

JULY 1951

BUSINESS · ENGINEERING · INDUSTRY

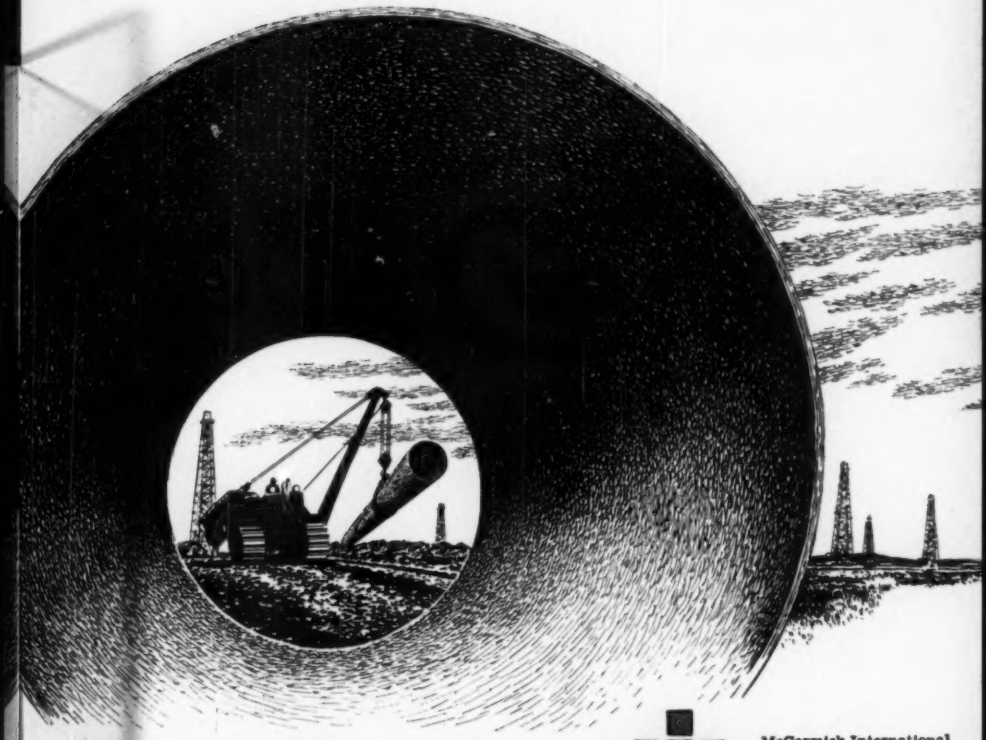
Table of Contents—Page 3

When economic health comes by the gallon!

Healthy industries make healthy nations. For example, petroleum is a *basic* industry that must maintain and increase its production. When it does, a multitude of other industries prosper with it.

Rugge[illegible]nternational Diesel tractors, power units an[illegible]lated equipment serve the petroleum industry well. They handle *every* power job; they clear and level land for drill rigs, man the pumps and lay pipe a hundred miles or more.

Consider the *basic industries* that make up the *physical and economic security* of your nation. International Harvester provides the necessary tools for transport, agriculture and all phases of earthmoving and construction. International Harvester Export Company, 180 N. Michigan Ave., Chicago 1, U.S.A.



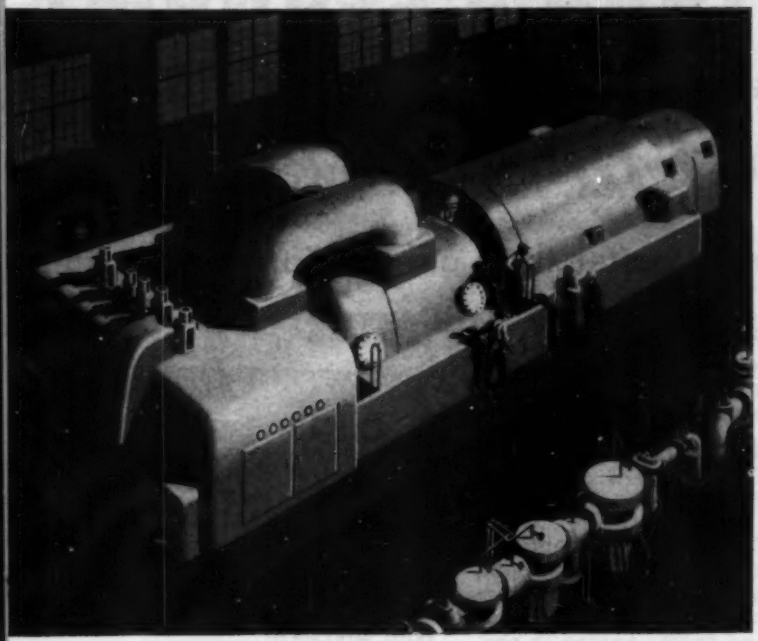
INTERNATIONAL HARVESTER

Builder of essential equipment for essential work

McCormick International Farm Equipment • International Trucks • International Industrial Power • International Harvester Refrigeration

ALLIS-CHALMERS

SERVING ALL INDUSTRY FOR MORE THAN A CENTURY



Electrical Equipment

Steam and Hydraulic Turbines, Condensers

Crushing, Cement and Mining Machinery

Centrifugal Pumps, Motors and Control

Flour Mills, Wood Processing Machinery

Power for Prosperity and Better Living

FROM steam turbo-generators like these comes low-cost electric power for industries that create payrolls and prosperity . . . for homes—to make them brighter, more comfortable . . . for workers in mills and factories—to make their labor easier, more productive.

Wherever power is generated, Allis-Chalmers is known as one of the world's big suppliers of major electric power equipment.

Electric power is just one of the many basic industries for which Allis-Chalmers builds specialized machinery. Allis-Chalmers is a major supplier for the cement, flour, mining, ore processing and steel industries—offers a single reliable source for many machinery needs.

For help on your machinery problems, consult the Allis-Chalmers distributor in your country, or write:

ALLIS-CHALMERS MANUFACTURING CO.
General Machinery Division
Milwaukee 1, Wisconsin, U. S. A.

BASIC MACHINERY FOR THE WORLD'S MAJOR INDUSTRIES

No other copying process offers you

ANTARA'S ECONOMY

60 TIMES FASTER—

many times better than old-fashioned "copying"!

60 TIMES FASTER because changes are made by simply adding new material to create a "composite master." No need to re-create an entire piece.

60 TIMES FASTER because copying errors are eliminated. There is no check-back to the original necessary.

60 TIMES FASTER because Antara's "speed" is the same, month after month —because longer shelf-life means fresher materials—because you save *waste, labor* and *processing* costs. Antara is the "Standard of Quality" among sensitized papers.

Cut Your Labor Costs, Speed Up Work With ANTARA!

Antara is 60 times faster because it duplicates in *one minute* what used to take an *hour* manually. Letters, files, photographs, drawings—anything.*

**If light won't shine through, an inexpensive intermediary step is taken.*

Antara—Dept. MH-3
General Aniline & Film Corp.,
Johnson City, New York

Please send me at once your free illustrated literature which fully explains the Antara process.

Name .....
Company .....
Position .....
Address .....

Cut Copying Costs . . . use

ANTARA*

Manufactured by

General Aniline & Film Corporation
Johnson City, New York

**Sold under the trademark OZALID in the United States*

McGraw-Hill DIGEST

VOLUME 6
NUMBER 7

Member—Audit Bureau of Circulations

McGraw-Hill Digest is published monthly by McGraw - Hill International Corporation for circulation in all countries of the world except the United States and Canada. Publication and executive offices, 330 West 42nd St., New York 18, N. Y., U.S.A. Curtis W. McGraw, Chairman of the Board; Willard T. Chevalier, President; Eugene P. Warner, Vice-President and General Manager; Joseph A. Gerardi, Secretary and Treasurer; John F. Chapman, Vice-President; K. Presbrey Bliss, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Director of Circulation. *Subscriptions may be ordered through Director of Circulation, through local book dealer, or McGraw-Hill, Aldwych House, London, W. C. 2 (British only).* Subscription rates: $5 for 1 year, $8 for 2 years, or $10 for 3 years; single copy 50¢ (U. S. currency). Entered as second-class matter December 17, 1947, at the post office at New York, New York, under the Act of March 3, 1879.

COPYRIGHT, 1951 by McGraw - Hill International Corporation, 330 West 42nd Street, New York 18, New York. Reproduction of items in full or part without written permission prohibited in all parts of the world.

JULY CONTENTS

Report to Management

Better Materials Handling Cuts Labor, Speeds Production 53

More Trade Barriers Down 17

Phototubes Control Register 20

This Month's How To 25

Arc-Welded Aluminum Crane 28

Cotton-Mill Testing Program 34

Melting Magnesium Alloys 40

Find Your Break-Even Point 48

AVIATION
Jet Blade Anti-Icing 38
Jet Blades Flight Tested 42
New High-Speed Tach 52

CHEMISTRY, METALLURGY
Rock-Phosphate Fertilizer . . . 23
Sulfuric Acid Processes 31
Zebra Openhearth Roof 43

CONSTRUCTION
Power Equipment Builds House . 19
Poured-in-Place Roof Deck . . . 30
Puts Concrete in Tension 52

ELECTRICITY, POWER
Reduces Boiler Slagging 19
Flyash Pays for its Disposal . . 30
Triple Fiberduct Serves UN . . 52

ELECTRONICS
Scintillation Counting 22
High-Speed Facsimile 23
Steel Pouring Televised 41

FOOD PROCESSING
Cuts Food-Pack Overfill 23
Pack Makes Potatoes Visible . 29
Cuts Candy Quicker 42

MECHANICAL DESIGN
Product-Design Activity 18
Dolly Tilts 1-Ton Reel 32
Holds Work for Machining . . 42

METALWORKING
Aluminum Cutting Torch 22
Doubles Abrasive-Belt Life . . . 45
Removes Fins From Cores . . . 51

MINING, PETROLEUM
How To Get More Crude Oil . 24
New Coal-Mine Explosive . . . 27
Lightweight Aggregate 38

PLANT MANAGEMENT
Run-Around Conveyor 27
Window Display That Sells . . 33
Production Upstairs 39

TEXTILES
How To Wind Filament Rayon . 26
Selvage Yarns from Spools . . 30
Processing Wool Fibers 41

TRANSPORTATION
Study of Colors 26
Truck Trailers Go by Rail 39
Grade Crossing is Smooth . . . 52

160 Items in This Issue

John F. Chapman, *Publisher*
Harry S. Wharen, *Editor*
Joseph A. Cohn, *Assistant Editor*
Dexter M. Keezer, *Economics Dept.*
Russell F. Anderson, *Editor, World News*
George B. Bryant, Jr., *Washington Bureau*

BLISS—for armament production by presses

HERE'S WHY...

If you plan to produce small arms ammunition, artillery cases, projectiles, military vehicles, aircraft parts, fuses, chemical containers or any one of thousands of pressed metal components for ordnance materiel—Bliss is the company best qualified to recommend both the equipment and methods. For Bliss designed and built more pressed metal machinery than any other company during World War II. It's logical to call on Bliss because:

Bliss has the engineering experience—over 90 years of it—and the manufacturing capacity—four plants—*to equip complete projects.* Bliss builds more types and sizes of presses than any other company in the world.

Bliss is skilled in all phases of press design—mechanical and hydraulic—for the drawing and extrusion of steel, copper and brass...for light metals and powdered metals.

Bliss builds the full range of automatic feeding, indexing and ejecting devices to obtain the maximum press output.

Whether it's a single press for a given job or a complete stamping plant, Bliss engineers welcome your inquiry. They will help you determine methods, production rates and costs without obligation.

E. W. BLISS COMPANY, CANTON, OHIO

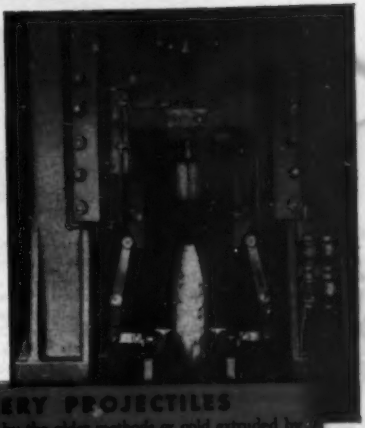
Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

SMALL ARMS AMMUNITION

Bliss produced over 8,000 presses and special machines for all types of small arms manufacture in World War II.

ARTILLERY CASES

(Hydraulic Lines for the larger cases.) Quick advance, constant-draw speed and quick-return features speed production. Tall draw presses in background have 108" stroke. Heading and tapering presses are beyond them.

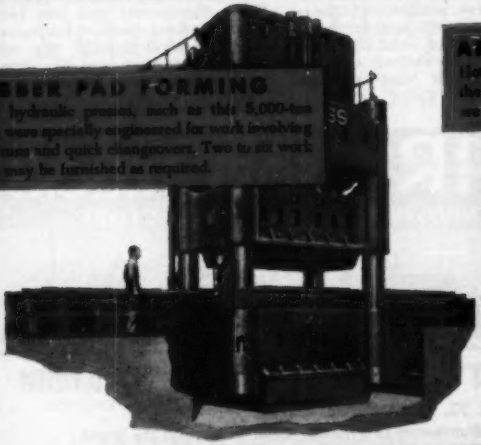


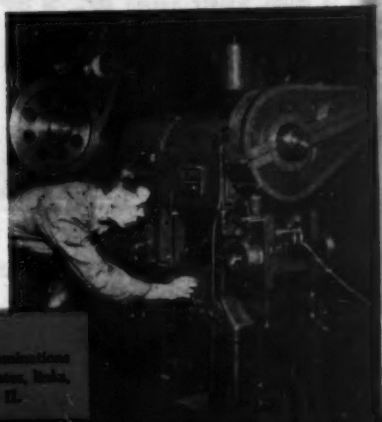
ARTILLERY PROJECTILES

Hot forged by the older methods or cold extruded by the new methods, Bliss hydraulic or mechanical presses are available for the light, medium or the heavy loads.

RUBBER PAD FORMING

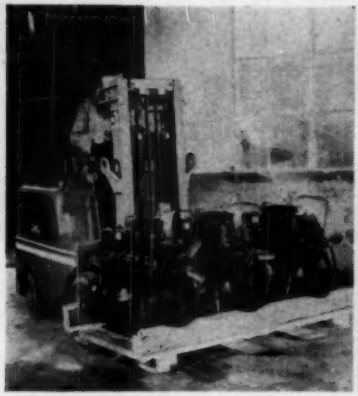
Giant hydraulic presses, such as this 5,000-ton unit, were specially engineered for work involving short stroke and quick changeovers. Two to six work stations may be furnished as required.





ELECTRICAL COMPONENTS

Hundreds of high production presses for motor laminations and ordnance parts like percussion caps, fuse plates, links, cartridge clips, were built by Bliss in World War II.

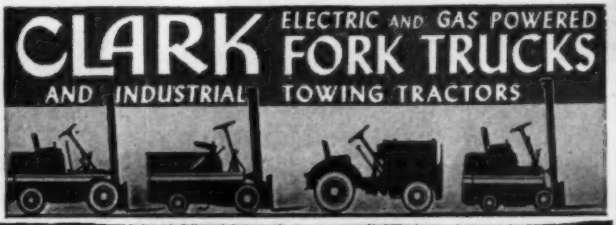


IN GERMANY, TOO—

THE tremendous task of rehabilitation requires that every possible means be taken for the efficient multiplication of manpower. Time is a vital factor. Delays must be avoided. The constant flow of materials, parts and finished products must be maintained if this important undertaking is to be successful.

One of the most effective steps toward this end has been the adoption of Clark Fork-Lift Trucks in many widely varied industries. The photographs shown herewith illustrate a notable example. In the plant of Adam Opel, A. G., Russelsheim am Main, Clark Fork-Lift Trucks are multiplying manpower on many different jobs . . . unloading heavy materials . . . moving materials and parts from one manufacturing operation to another . . . stacking for storage . . . loading finished products for shipment. All these jobs, and more, are being done quickly, easily, and economically. Clark Fork-Lift Trucks make possible more effective utilization of storage space through higher, more orderly stacking and tiering. Unit loads are shifted quickly with the result that storage areas are kept flexible and more readily usable at all times. And, of course, the cost of all this handling and moving is reduced to a minimum. In fact, this saving alone quickly pays the entire cost of the Clark Equipment.

This modern method of handling has demonstrated its remarkable efficiency and economy in many different types of industries in many countries. There must be equally valuable applications for it in your business. The Clark distributor in your country will give you full details about the various types of Clark Equipment and will help you to select those best suited to your requirements. We will be glad to give you his name and address upon request.



CLARK EQUIPMENT COMPANY • EXPORT DIVISION

BATTLE CREEK 73, MICHIGAN, U.S.A.

Other Plants—Buchanan—Jackson, Mich. Distributors in Principal Cities Throughout the World

Petroleum Helps

on Land . . . on Sea . . . in the Air

For years the petroleum industry has helped modern transportation to become more efficient. Goods and people today can travel farther and faster – making the world seem smaller.

As one of the leaders of the petroleum industry, Esso will continue to produce the essential fuels, lubricants and other petroleum products needed by transportation.

Petroleum helps to build a better life.

Stop at the nearest Esso Sign for Quality Petroleum Products and Service.

Banking service to develop and maintain

YOUR WORLDWIDE TRADE

You'll find this familiar seal—and the banking service it represents—in a dozen great world centers of commerce and industry. From Bangkok to Milan, a network of modern banking offices offers efficient, *experienced* service to help you develop and maintain your profitable worldwide trade connections.

So whatever your banking needs—foreign exchange, remittances, collections, letters of credit, Travelers Cheques—use the facilities of the world's largest bank. Write Bank of America at the address nearest you.

Bank of America
(International Service)
40 Wall Street
New York, N. Y.
(A wholly owned subsidiary)

Bank of America
NATIONAL TRUST AND SAVINGS ASSOCIATION
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION
More than 500 branches in 300 California communities

SAN FRANCISCO—International Banking Department
300 Montgomery Street, San Francisco 20, California

LOS ANGELES—International Banking Department
660 South Spring Street, Los Angeles 54, California

Overseas Branches

LONDON—12 Nicholas Lane, E.C. 4, between King William and Cannon Streets

GUAM—Agana, Guam

TOKYO—Yaesu Building

KOBE—1 Kaigan-Dori Ikuta Ku

YOKOHAMA—33 Nihon-Odori, Naka-ku

MANILA—139 Juan Luna

BANGKOK—1169 Charoen Krung Road

Representatives in Paris, Zurich, Milan. Correspondents throughout the world.

Carry Bank of America Travelers Cheques. They protect your travel funds and they're honored the world over.

BUSINESS TRENDS

U. S. MOBILIZATION is shifting into high speed this summer. Shortages and controls are beginning to pinch U. S. industry. Inflation, after leveling off for several months, is again an active threat.

Mobilization has not hurt Americans much until now. Shortages have not been serious; production of civilian goods has roared along. First economic controls were not strong enough to have much effect on business profits, workers' wages, or farmers' incomes. And inflation slowed to a walk after a 7-month spurt caused by the post-Korea business boom.

But now the defense program is gaining momentum—after months spent planning, tooling up factories, and expanding facilities. Actual spending for military services shows the trend: It was about $19.4-billion in the year ending June 30—only about 50% higher than the previous year. But now it is rising fast, should reach a rate of about $50-billion a year by December.

Civilian production will fall as military output grows. In the third quarter, consumer-durable industries will get only 65-70% as much steel as they got before Korea.

Consumers will not feel these shortages right away because supplies in stores are big, should last through most of this quarter. By fall, civilians will be getting less durable goods as controls shift metals to defense.

Inflation is a danger again—in spite of broader, stricter controls. Consumers' incomes are rising. The government is running a big deficit, putting money into the public's hands. With more money, but less goods to spend it on, consumers will be bidding prices up again this fall.

Mobilization speed-up means more problems for buyers of U. S. goods. Fewer durable products will be available for export in the coming months. Those that are available are likely to cost more by year's end.

U. S. FOREIGN TRADE may set new dollar-volume records this year and build up gold and dollar reserves of other countries. Exports are already high, even though U. S. military assistance is still small-scale. First-quarter imports were about $3-billion, should hold near that level throughout the year.

Total exports of $15- to $15.5-billion are expected by Washington officials. Exports of capital goods and durable consumers' goods may decline during 1951, as defense takes more of U. S. metals. But arms shipments will more than make up the gap, raising average quarterly exports over the first-quarter mark.

Imports may set a new record—U. S. stockpiling and mobilization demand for raw materials should raise them to about $12.5-billion. A fall in prices of raw

materials could cut dollar volume of imports. But no one expects much of a drop. Demand is too high, and producers are reluctant to make international agreements to cut prices.

Other countries' gold and dollar reserves should gain in 1951. Nations abroad will earn about $12.5-billion from U. S. imports, and about $4-billion of U. S. exports will be "free"—under MDAP, ECA, Point Four, and the Export-Import Bank. So—after paying for imports from the U. S.—other countries should add $1.5-billion or more to their gold and dollar reserves.

NEW SYNTHETIC FIBERS (McG-H Digest, Nov'50,p40) threaten the U. S. market for natural textile fibers. Output is growing fast, may reach a rate of 100-million lb. or more a year by end of 1952. In the long run, producers see practically no end to demand; they expect to sell several hundred million pounds of new fibers a year within the next 5-10 years.

First target of the new fibers is the huge U. S. market for wool. Many new fibers are as soft, warm, and strong as wool—and cost less than half as much. They resist moths and mold, will not wrinkle or crease easily. Producers hope that synthetics will someday replace wool as nylon has replaced silk.

Dacron is a Du Pont polyester fiber, descended from the British Terylene. It is strong and wrinkle-resistant, keeps a crease even when doused with water. Suits of a Dacron-wool blend are now selling in New York, and the fiber has already appeared in women's blouses and other clothing. Lightweight and high resistance to heat make it a good industrial fiber.

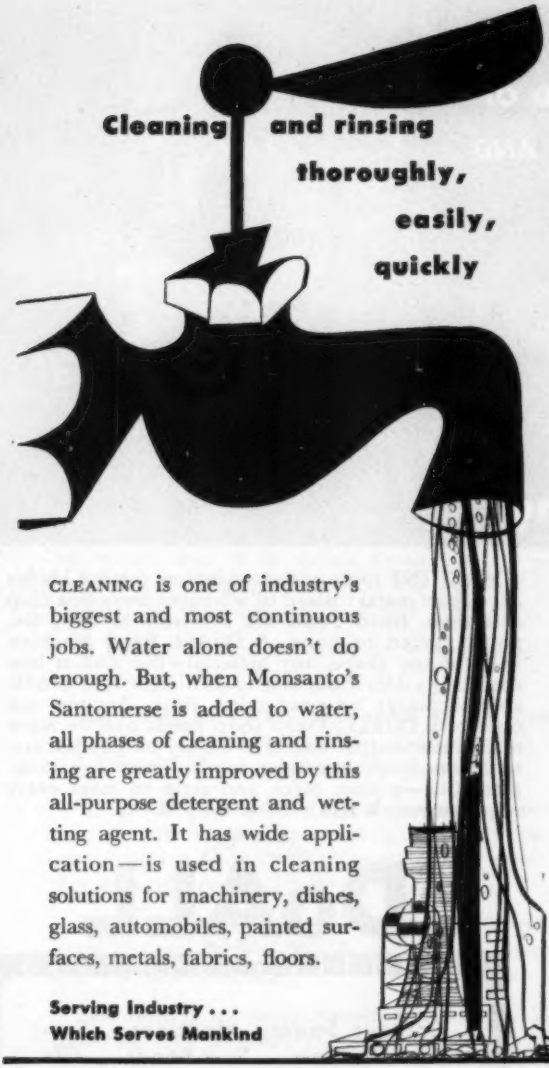
Orlon is a Du Pont fiber made from acrylonitrile. It excells for industrial use, is acid-resistant, and withstands sunlight and weather better than any other textile fiber. Cloth made from Orlon staple will be used in clothing; it is as warm as wool with 30% less weight.

Dynel is a Union Carbide & Carbon copolymer of vinyl resin and acrylonitrile, and is soft enough for babies' blankets. Usefulness in industry comes from its good insulating qualities and failure to support combustion.

Many companies are producing or experimenting with other new fibers, such as Chemstrand. Producers expect them to become major factors in the textile world within the next few years.

The older synthetics—rayon, nylon, and others—keep rolling along. Rayon production was about 1.3-billion lb. last year, should reach 1.6- to 1.7-billion lb. by 1954. Nylon output is growing from 20-million lb. in 1945 to an expected 240-million lb. in 1952. A revealing indication is that 28% of the fiber used by one major carpet maker this year will be rayon. Nylon can now be made to absorb water and is better for underwear.

Cleaning and rinsing thoroughly, easily, quickly

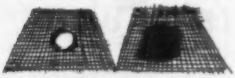


CLEANING is one of industry's biggest and most continuous jobs. Water alone doesn't do enough. But, when Monsanto's Santomerse is added to water, all phases of cleaning and rinsing are greatly improved by this all-purpose detergent and wetting agent. It has wide application—is used in cleaning solutions for machinery, dishes, glass, automobiles, painted surfaces, metals, fabrics, floors.

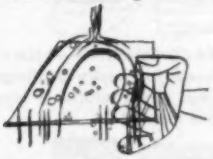
Serving Industry . . .
Which Serves Mankind

Santomerse is an ideal product for resale by formulators in their own special or private-brand packages. Because it is an all-purpose detergent with great sudsing power in hard or soft, hot or cold water, Santomerse offers formulators and packagers a tremendous retail market.

Santomerse makes water wetter, penetrate faster. Plain water supports wool yarn, which sinks rapidly after a little Santomerse has been added. Santomerse is effective in either acid or alkaline solutions.



Santomerse gives water spreading power that speeds any job of wetting. Note drop of plain water at left; drop of Santomerse solution at right.



Santomerse causes dirt-carrying water to rinse away completely and quickly — prevents redeposits of dirt particles.

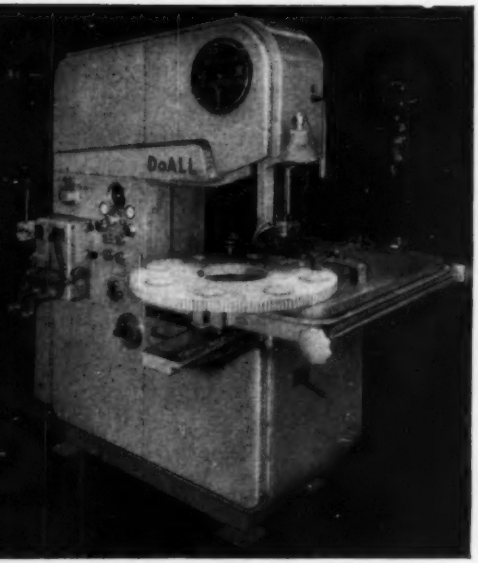
Santomerse: Trade-mark registered.

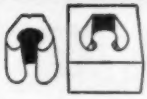
MONSANTO CHEMICAL COMPANY, *St. Louis 4, Missouri, U. S. A.* • MONSANTO CHEMICALS LTD., *London* • Monsanto (Canada) Ltd., *Montreal* • Monsanto Chemicals (Australia) Ltd., *Melbourne* • Monsanto Chemicals of India, Ltd., *Bombay*. Representatives in principal cities.

MONSANTO
CHEMICALS—PLASTICS

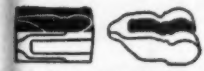
WORLD'S FASTEST PRECISION METHOD OF REMOVING METAL AND OTHER MATERIALS

DoALL Band Machining





FOR DIEMAKING—often punch and die can be made in one operation.



FOR SHAPE CUTTING—eliminates need for costly castings or forgings when relatively few pieces are needed.

FOR SHEET METAL PARTS—stack the metal and contour saw it. Also for making TOOLS, FIXTURES, JIGS, PARTS.

The DoALL Company
254 N. Laurel Ave.
Des Plaines, Ill., U.S.A.
Representatives in Principal Cities Throughout the World.

• MACHINE tools with continuous cutting blades slice apart metal instead of whittling away one chip at a time. Band Tools are available to saw, file, polish, grind or hone. A DoALL Band Machine will cut any shape, any material—fast and at low cost. It is a dozen machine tools in one. Will handle special pieces or production runs. Anyone can operate a DoALL. Every shop needs one or more to increase output and save money on production, toolroom or maintenance work. There is a complete line—a size, piece and style to meet every requirement. WRITE FOR CATALOG.

DoALL

Contour Sawing Machines . . . Surface Grinders . . . Saw Bands . . . File Bands . . . Gage Blocks . . . Metal Working Supplies.

WASHINGTON REPORT

EUROPE WILL RATE number one priority for American arms aid—for at least the next 2 years. President Truman's blueprint to Congress for more foreign-aid makes that perfectly clear.

Despite the hullabaloo kicked up by General MacArthur and his Congressional supporters, President Truman and his State Department and military advisers are absolutely determined to follow through with plans for first strengthening Western Europe's defenses. Look at the following figures:

Of the $8½-billion the President wants for fiscal 1952, more than $7½-billion would go to Atlantic-Pact countries, the Middle East, and North Africa.

The Far East would get but $930-million, for both economic and military aid during the same period. Nationalist China is due to get the biggest chunk of this, partly as a move to pacify domestic critics of Far Eastern policy. But the Administration definitely has no intention of embracing Chiang Kai-shek as the only hope for ridding the Chinese mainland of Communists.

The State Department, especially Assistant Secretary Dean Rusk, views Chiang less harshly than it did before Korea. It still believes Chiang has little or no support in China proper and is not the answer to Communism, although sentiment seems to be changing with time and MacArthur.

In Europe, France will continue to gobble up the biggest share of American weapons, perhaps $2-billion worth.

The French have promised to create 20 new divisions by the end of 1952. They are to be the backbone of General Eisenhower's army. And the General feels they should be rearmed before the Germans.

Western Germany, Spain and Yugoslavia are due to share in the arms-pool too, even though no specific amounts are set aside for them by Congress. The administration could divert at least 10% of arms funds to any area in the world if it believes American security demands it.

President Truman's special message to Congress asking for the money also made it clear that the U. S. is paying more attention to the oil-rich Middle East and the Mediterranean.

This reflects increased American worry over Communist threats in the Arab countries. Air Secretary Finletter sounded this alarm after a trip into the area last January.

Turkey is to be the defense pivot. A bigger flow of arms will go to the tough Turkish army, with the enthusiastic approval of the Defense Department. Nothing was spelled out specificly to Congress, but Iran's share during 1952 will be

WASHINGTON REPORT (Continued)

nearly $70-million—as much as it received during the past 2 years combined.

THE MARSHALL PLAN IS DEAD. President Truman officially buried it when he asked for but $1,650,000,000 from Congress for economic aid to Western Europe during fiscal 1952.

The sum may look big. But nearly all of it will go not for economic recovery but to finance projects that will boost Europe's output of arms.

The only countries that will get any American dollars for non-defense purposes are Italy, Greece, Austria, and perhaps Western Germany.

HOWLS OF PROTEST from Latin America are flooding the State Department as an aftermath to the President's foreign-aid request. The Latins claim Uncle Sam is discriminating against them.

On paper, they have a case. Only $66-million were set aside for grants to 20 American republics. About $40-million will be for arms shipments.

The State Department is answering this criticism by pointing to this fact: Congress was asked to boost loan funds of the Export-Import Bank by $1-billion. This means, it says, more and bigger loans to Latin America.

The Latins, however, are not too much impressed with this argument. They want not loans but grants of the kind the U. S. has been dishing out to other countries for the past 3 years.

ITALY AND YUGOSLAVIA are about to patch up their bitter argument over Trieste—with the blessings of the U. S., Britain, and France.

A compromise solution, splitting the territory pretty much along present occupation lines, is in progress. Tito is anxious to settle this once-explosive problem so he can concentrate on building his defenses against Russia.

Italy would have started secret negotiations in May. But Premier De Gasperi decided he had better wait until after the May elections to avoid handing campaign ammunition to the Communists.

RUSSIA'S GRIP on Albania appears to be slipping. An anti-Communist revolution is now more than a possibility.

Dictator Hoxha and his Moscow-trained rival, Mebmet Shehu, are feuding for power. Meanwhile anti-Communist partisans, supplied by Greece, Yugoslavia, and probably the U.S. and Britain, are picking up strength outside Tirana.

Several pitched battles have been fought in the interior. Ordinarily pessimistic observers are talking hopefully of chances for a pro-Western Albania.

THIS HAMMER has 24 heads

FMC nailing machines automatically drive dozens of nails at each thrust, to meet the specific requirements of nearly every kind of industrial nailing procedure. Other FMC built machines perform every type of fruit and vegetable box-making and lidding operation. For full details write FMC Export Dept., San Jose 6, California, U.S.A.

Other FMC Division-made products are described in booklet No. E-105, sent on request.

FOOD MACHINERY AND CHEMICAL CORPORATION

EXECUTIVE OFFICES, SAN JOSE 6, CALIFORNIA U.S.A.

PEERLESS HOUSEHOLD PUMPS | FMC FOOD PREPARATION EQUIP. | NIAGARA AGRICULTURAL CHEMICALS | FMC FOG FIRE FIGHTERS

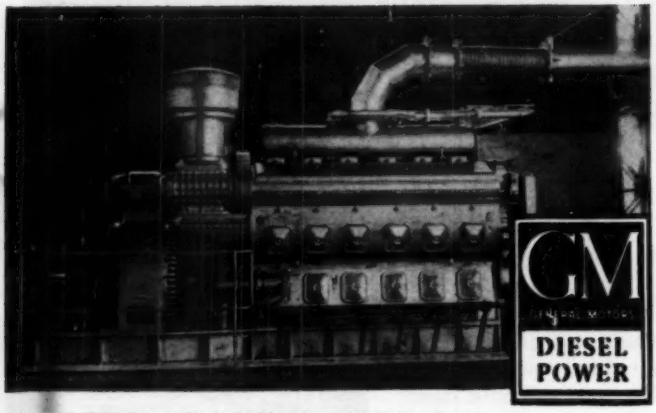
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

GENERAL MOTORS

The World's Greatest Producers of
DIESEL POWER

(73,170,380 HP thru Dec. 1950.)

Industrial Diesel Generator units of 350 to 1000 KW output are operating in, or ordered for, the following countries:



750 KW G.M. Diesel Unit in interior of Belgian Congo

ANGOLA
ARABIA
ARGENTINA
AUSTRALIA
BELGIAN CONGO
BOLIVIA
BRAZIL
BRITAIN
CAMEROONS
CHANNEL ISLES
CHILE
ECUADOR
EL SALVADOR
GREECE
INDONESIA
ITALY
MEXICO
PERU
PORTUGAL
SOUTH AFRICA
TRINIDAD
VENEZUELA

GM DIESEL GENERATOR UNITS ARE:

Easy and inexpensive to install, shipped fully assembled from factory;
Easy to operate, due to automatic devices controlling lubrication, cooling and load;
Easy to maintain, due to interchangeability and light weight of parts;
Reliable and economical in operation, due to GM unit injectors, uniflow scavenging and other exclusive features.

FREEDOM FROM POWER LIMITATION PAYS DIVIDENDS

GENERAL MOTORS OVERSEAS OPERATIONS

New York 19, New York, U.S.A.

For Information Address GENERAL MOTORS at . . .

ARGENTINA .....Buenos Aires
AUSTRALIA .....Melbourne
BELGIUM .....Antwerp
BRAZIL .....Sao Paulo
CUBA .....Havana
DENMARK .....Copenhagen N
EGYPT .....Alexandria
ENGLAND .....London, S.W. 1
FRANCE .....Paris
GERMANY .....Russelsheim/Main
INDIA .....Bombay, No. 1
INDONESIA .....Djakarta
MEXICO .....Mexico, D. F.
NEW ZEALAND .....Wellington
PAKISTAN .....Karachi
PERU .....Lima
PORTUGAL .....Lisbon
SOUTH AFRICA....Port Elizabeth
SPAIN .....Barcelona
SWEDEN .....Stockholm 20
SWITZERLAND .....Bienne
URUGUAY .....Montevideo
VENEZUELA .....Caracas

July 1951 • McGraw-Hill DIGEST • Volume 6 Number 7

More Trade Barriers Down

Reciprocal tariff reductions with seventeen countries signify success of Torquay conference; all expected concessions not gained

GENEVA, ANNECY, TORQUAY have all witnessed substantial advances in the field of international trade relations. The excellent work begun in Geneva in 1947 and continued at Annecy, France, in 1949 has been extended at the 7-month long, 34-country tariff conference recently concluded at Torquay, England. This probably is the last mass tariff-cutting session for some time.

The agreements reached have been disappointing to world traders in some respects. But they still must be considered remarkable when one recognizes that they were arrived at in a period of expansion in the Korean war, rearmament by the West, price rises of raw materials, renewed stockpiling of strategic materials, and a growing return to a sellers' market.

The U. S. has received some unjustified criticism in European quarters for its apparent unwillingness to grant widely sweeping tariff reductions and for its renewed opposition to the British Commonwealth preference system. But consider the facts.

Tariff Cuts to 50%

The U. S. will cut tariff from 25–50% on a tenth of all the goods now subject to import duties. These goods accounted for 16% of the 1949 value of total U. S. imports.

In return, the U. S. will get tariff cuts from 15 foreign countries on less than one-twentieth of its exports. Most of these cuts will be trivial.

With Australia, Cuba, India, New Zealand, South Africa, and the United Kingdom, no agreements could be reached on expanding past concessions. Failure to negotiate any agreements between the Commonwealth members and the U. S. may be blamed on the U. S. for demanding too much in the shape of reductions in margins of Commonwealth preferences.

Tariff Reductions Offered

But the U. S. also made extensive offers of tariff reductions. These offers were in line with its announced intention to work for lower tariffs and elimination of discriminatory regulations that impede international trade. It is evident that these offers were not enough to prevent the British from relying on the proved security of the preference system, protected as it is by exchange control and import licensing.

The U. S. exchanged concessions at Torquay with 17 countries. Five of them became members to the General Agreement on Tariff and Trade for the first—Austria, Western Germany, Korea, Peru, and Turkey. Germany was one of the nations that obtained largest concessions from the U. S. and, in return, granted quite major concessions.

But at this tariff-reduction conference, 16 countries announced tariff increases. France, in the face of bitter objections from the traditionally low-tariff countries of Europe, said she was raising duties on 38 different types of goods.

All together, 147 bilateral agreements were reached. More than 1,300 tariff items were either sharply reduced

or held at present levels by the U. S. The total actually is much larger as reductions given to any one country are given to all countries, including those not offering concessions.

Items on which cuts were given vary over so many fields that only a few can be mentioned. Duties on lead, bismuth, chromium, zirconium, vanadium, barium, and some other metals will be cut in half. Those on zinc, pig iron, ferromanganese, and titanium will be cut 20–30%. Agreements, for example, with Canada and Peru cut pig-lead duty from 2½ to 1¼¢, slab-zinc duty from ½ to 7/10¢, aluminum from 2 to 1½¢.

If you manufacture clocks, for examples, you will benefit from the 50% lower duties on many types of clocks and clock parts. Or if you make Italian earthenware or matches, lowered rates may mean more sales. Cigars? Duties are sliced in half. Champagne, wines, perfumes? All tariffs down.

From Cocoa to Caviar

Then too you will find cuts on the cocoa and chocolate you send to the U. S., on tanning extract, lampblack, white lead, German razors, sewing machines, Brazilan plywood, Swedish taximeters, French post cards, Norwegian fish cakes, Korean iodine, musical instruments, mica, pistols, china, cameras, bananas, cheese, caviar, and a host of other goods.

If you are buying from the U. S., some goods will be cheaper. A few examples: Brazil cut duties on electric motors and dynamos; Norway on some types of tractors and on boring, drilling, and grinding machines; Peru on electrical equipment.

Other countries cut tariffs on typewriters and office machinery, and on tires, passenger cars, trucks, and many other products. The most substantial reductions came from Canada, Germany, France, Belgium, Holland, Luxembourg, Austria, Turkey, and Peru.

Product-Design Activity Reported from Abroad

Amount of design development—or lack of it—is one index of a country's strength. McGraw-Hill World News correspondents report from:

London—Design and development work is at peak levels in machine-tool, automobile, aircraft, and electrical-equipment manufacturing plants. Machine-tool developments include work loading and unloading and speed-control devices. Automotive trend is to greater cubic capacity, slower piston travel, heavier bodies. Aviation trend is toward gas-turbine engines.

Paris—Major design trends are only now becoming evident since the war. In automobiles, the trend is toward ultra-utility and ultra-economy. Renault has gone to "prestressed" steels. In textiles field, three different circular looms are reported as satisfactory.

Rome—Scarcity of capital, unsettled political conditions, and market conditions are delaying Italian development work. But new aircraft designs are underway, Fiat has introduced an economy automobile with an American body, and Olivetti typewriters have been well received in export.

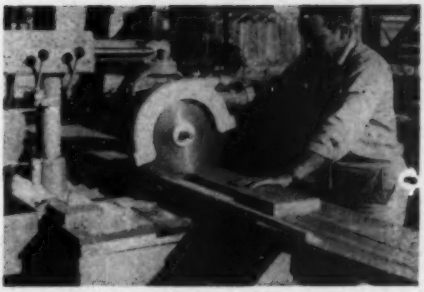
Rio de Janeiro—Little original product design is being done in Brazil, except of consumer goods of light nature. Capital goods as well as heavy consumer goods are imported.

Buenos Aires—Creative work is practically nil in Argentina. Refrigerators, for example, are copies of American and British designs.

Tokyo—Design trends run almost entirely to copying American products. An exception is the excellent Nippon Optical Co.'s 35-mm. camera.

Melbourne—Design is hindered by small markets, so most equipment will continue to be made to foreign blueprints.—Prod Eng, May, p148

POWER DRILL with long bit speeds tieing on of concrete forms, eliminates much effort and time consumed.



RADIAL SAWS are mounted on trailers for easy moving around job. Power saws permit greater volume of work in less time.

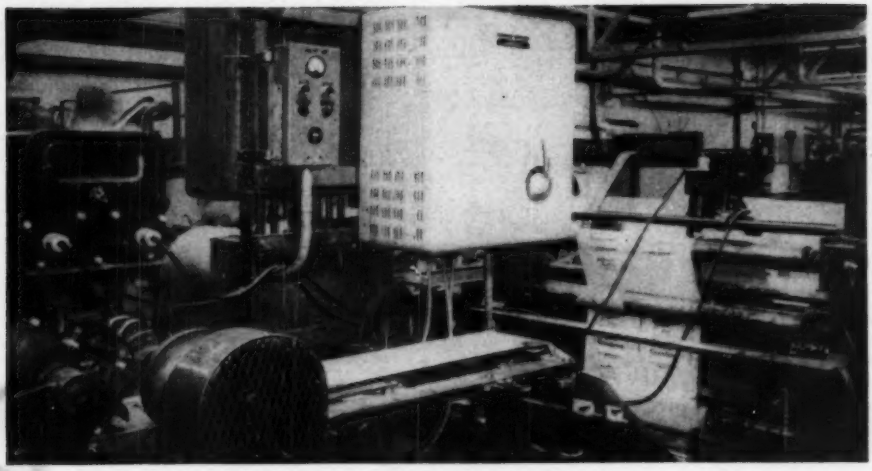
Power Equipment Builds House

ROUTING JIG (left) places door hardware while door is held in clamp. Right, power plane trims door for proper fit.

ELECTRIC DRILL (left) speeds plumbing installation. Automatic nailer (right) aids sub-floor placement.

ESCALATOR BELT delivers shingle bundles to ridge of roof. Belt is reversible to permit return of surplus bundles of shingles to the ground.

VERSATILE TOOL tamps concrete, puddles and compacts it, rods it off. Machine is pulled over walk by two men. Other men finish walk.—Am Builder, May, p96



WEB-REGISTER CONTROL, installed on a bag-making machine, has scanning head that views register marks and selector switch that checks cutter position

Phototubes Control Register

Recently developed automatic register circuits increase output and improve quality of high-speed winding and packaging machines

AUTOMATIC PACKAGING at high speed goes hand in hand with mechanized production of consumer goods. Manual handling, filling, and sealing must be eliminated if costs are to be brought down to competitive levels.

But automatic packaging demands precise control. For a machine to convert a web of printed paper into a wrapping with each design centered on each package, some type of photoelectric web-register control is needed.

The single phototube feeding a few amplifier tubes that actuate the cutter-bar solenoid is no longer equal to the task. Thyratrons, saturable reactors, and selsyns now appear in control circuits. Some even use as many as three phototubes to obtain the required accuracy of register.

Minor modifications can adapt the same equipment for side-register control. This insures that paper, rubber, metal, or other sheet material is wound evenly onto a roll. Correction is made by shifting of the winding arbor in either direction as required to keep the wound edges even.

The circuit diagram is for such a General Electric phototube side-register control. The tube is aimed at the edge of a continuous strip of paper or metal being wound on a roll. It detects and corrects any sidewise motion.

At the desired strip position, a beam of light from the light source is half cut off by the edge of the strip. Neither of tubes V_{4A} or V_{4B} passes enough plate current to pick up the relays.

But if the edge of the strip moves

so less light hits the phototube, its increased resistance drives the grid of tube V_{2A} more negative. The resulting lower plate voltage in V_{2A} causes a reduced voltage drop across R_1, making V_{4A} grid more positive so the tube picks up relay 1. Relay contacts then make the roll-shifting motor move the roll axially in the proper direction so half the light beam reaches the phototube.

If the roll moves too far or if the initial error were such that more than half the light beam reached the phototube, tubes V_{2A} and V_{2B} act as a long-tailed pair to operate relay 2 and make web correction in the opposite direction. Resistor R_3 is the long tail for this pair of tubes.

When the motor moves the roll left or right to seek a central position, the roll may coast beyond the center and cause a hunting effect. To avoid this condition, a dead-zone adjustment R_5 is added to let the roll overshoot somewhat without causing an opposite correction and hunting. The wider dead zone is obtained at a definite sacrifice in the smoothness of the wound roll.

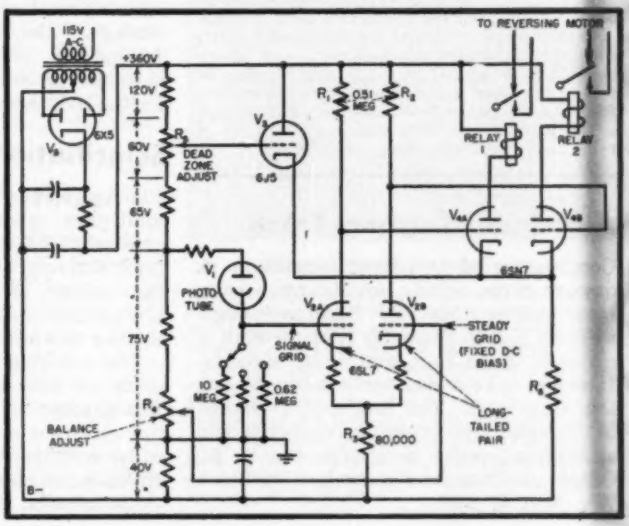
A similar control system can be devised to utilize two thyratrons instead of relays. The thyratrons supply current directly to the roll-correction motor. One thyratron fires to make the motor move the roll sidewise in one direction, while the other causes roll movement in the opposite direction. This system also has two triode tubes that with a resistor operate as a long-tailed pair, just as in the system diagrammed.

A cutoff web-register control can be made from the previous system by replacing the single phototube circuit with a three-phototube arrangement. Material can be cut off precisely at printed register marks as it is drawn off a roll at high speed.

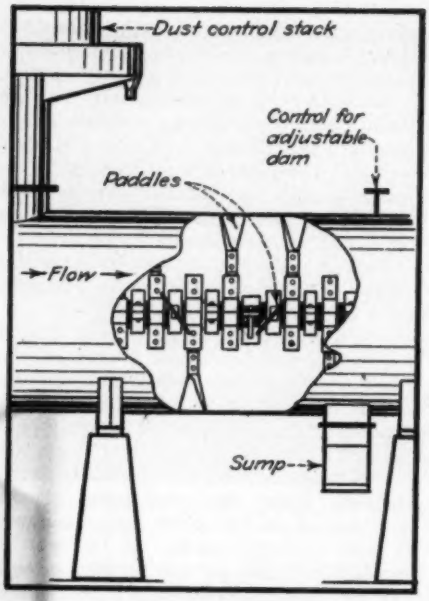
Cutter rolls are driven at constant speed. But draw-roll speed is changed by a correction motor.

A beam of light is so located that a preceding register mark decreases the light reaching one phototube at the exact instant that a register mark reaches the cutoff point. The other phototubes then see when cutter operates.

The selector-switch assembly that includes these two phototubes checks position of cutter knife and compares it with register marks. If the web is moving too fast or too slowly, a correction motor changes draw-roll speed to advance or retard the web.—Electronics, May p92



***SIDE-REGISTER** control lines up ends of rolled sheet while it is being wound*



HYDRATES QUICKLIME

New lime hydrator, announced by Hardinge Co., avoids usual dust nuisance by spraying all water needed for hydration into a dust-control stack. Water wets down dust, passes into hydrator cylinder, and there reacts with quicklime (calcium oxide) to form hydrated lime (calcium hydroxide). Paddles do necessary mixing. Four sizes of hydrators available range from 1 to 5 tons per hr.—Chem Eng, May, p179

Aluminum Cutting Torch

Combustion of powdered aluminum in oxygen gives terrific heat that has been measured at 5,500° F. That is enough to chew a 2-ft. diameter hole through a concrete drum in a matter of seconds. It would take a gas torch hours to cut the same hole. The Research Institute of Temple University is studying the aluminum-powder torch for the U. S. Office of Naval Research.—Business Wk, May 5, p26

Sulfite and Kraft Pulps Made from Cotton Stalks

Paper-making qualities of cotton stalks has been investigated by U. S. Dept. of Agriculture's Northern Regional Research Laboratory. Samples were pulped by methods developed for wheat straw, but modified where necessary. Findings included:

1. Cotton-stalk pulps produced by neutral sulfite method were weaker than those of neutral sulfite wheat-straw pulps.

2. Kraft pulps prepared from cotton stalks had strength properties quite similar to those of wheat-straw kraft pulps. Strength is probably due to its content of relatively long bast fibers from the bark-like stalk sheath.

3. With both sulfite and kraft processes, yields were lower from cotton stalks than from wheat straw.

4. Considerably more cooking chemicals were required for cotton stalks.

5. Economical harvesting method has not yet been developed, nor are there suitable methods of preserving stalks in storage. Commercial production will depend on development of economical methods to collect and store stocks.—Paper Ind, Apr, p46

Scintillation Counting

Placing 4,000 volts on a conventional multiplier phototube instead of the prescribed 1,000 volts has enabled Stanford University researchers to extend the range of scintillation counters. Use of high voltage is made possible by cutting down on duty factor.

The counting speed was increased for study of Stanford's linear accelerator. The greater counter speed may enable time-in-flight measurements to be made with sufficient accuracy to facilitate direct mass measurements of particles. —Electronics, May, p218

Electronic Control Chart Cuts Food-Pack Overfill

Overweight food packages can dent the profit column. But a new automatic electronic statistical-control system prevents overfills with these advantages:

- Reduces labor cost by eliminating manual check-weighers.
- Corrects filling machine only when justified by shift in average package weight.
- Reduces variation in package weights to minimum possible for particular packaging process.
- Checks every package.

An electronic check-weigher weighs every package as it moves along a conveyor belt, and develops an electrical signal proportional to the deviation from the desired weight. The signal is applied to an electronic computer that determines average weight and weight range.

Signals produced in the computer are compared with fixed signals representing the statistically determined control limits. When the sample average or range is outside of control limits, a correction signal is produced. Such correction signals are applied to a meter on the instrument or through a servo-controller to adjust the filling machine. —Food Eng, May, p55

Rock-Phosphate Fertilizer

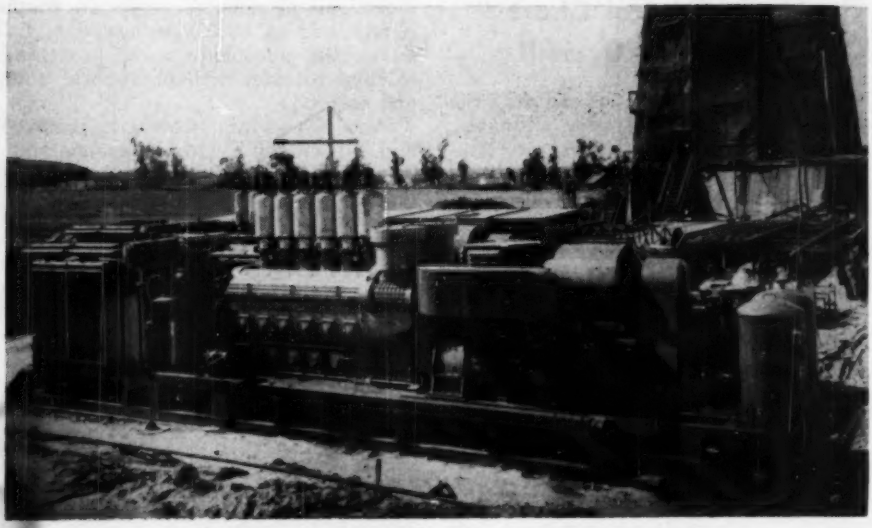
Making fertilizer, by decomposing rock phosphate with nitric acid involves (1) treating with acid, (2) separating out calcium nitrate by cooling and crystallization, (3) ammoniating to get ammonium nitrate, dicalcium phosphate, and ammonium phosphate, and (4) drying slurry to get nitrogen-phosphorus fertilizer.

Netherlands State Mine (Holland) has found it possible to obtain desired mixtures of ammonium nitrate and dicalcium phosphate, such as 60-40. Nitric acid of 50% concentration dissolves the phosphate rock, producing calcium nitrate, orthophosphoric acid, and water.

Part of calcium nitrate is removed and the mother liquor is ammoniated. The pH is carefully controlled so the final product contains no calcium nitrate, which would make it hygroscopic (water absorbing). After neutralization, the mixture is concentrated, granulated, dried, and cooled.—Chem Eng, May, p116

HIGH-SPEED FACSIMILE

New facsimile system, developed by Western Union, can transmit and record in final form up to 3,000 words of newsprint per minute. Copy is placed in either of two horizontal cylinders, which revolve at 1,800 rpm. Pin point of light focuses on revolving page and moves parallel to cylinder. Photocell reacts to varying light and impulses go to recorder via radio beam or wire circuit. Recorder then reproduces copy on electrosensitive dry recording paper.—Electronics, May, p160



NEW DRILLING RIG POWERED BY DIESEL ENGINES

Unusual diesel-electric drilling rig, recently unveiled by Standard Oil Co. of California, is designed for drilling to 8,000-12,000 ft. It is powered by two General Motors 1,200-hp., locomotive-type diesel engines (one shown) salvaged from Navy ships. The 12-cyl., 750-rpm. units power d-c. generators to supply electricity for draw works, rotary and mud pumps, motors, and other uses. Outstanding innovation of rig is amplidyne control to regulate output of motors and to limit power delivered. Using some surplus equpiment kept rig cost to $400,000.—Oil & Gas J, Apr 19, p224

How To Get More Crude Oil by Seven New Techniques

More oil from the limestone reservoirs in Texas oil fields was the single topic at the recent Oil Recovery Conference of the Texas Petroleum Research Committee. These seven new methods, all now being applied in small-scale field tests, were examined:

1. Atlantic Refining Co.'s high-pressure gas-injection process (McG-H Digest, Apr '50, p48). Large-scale operation will soon be undertaken.

2. Injection of inert gases. Tests have not progressed far enough to give dependable quantitative data.

3. Application of heat to reservoirs. One suggestion is to produce hot gases underground from coal basins located near oil fields and inject them into oil reservoirs without bringing them to the surface. Oil would vaporize and move to producing wells.

4. Extraction of oil by hydrocarbon solvents if it is not necessary to separate completely the solvents from the crude oil.

5. Combined injection of gas and water. Indicated recovery improvement is 10-15%.

6. Chemical flooding, such as by carbon dioxide (McG-H Digest, Apr, p35), surface active compounds, or compounds to increase permeability.

7. Release of oil by bacteria.—Oil & Gas J, Apr 26, p80

This Month's How To . . .

. . . return shipping drums cheaply is the main feature of U. S. Rubber Co.'s new shipping drums made of Ustex (tough cotton fiber) impregnated with synthetic rubber. They are lightweight (30 lb. for 55-gal. drum), non-absorbent, and corrosion resistant. They also are collapsible and can be folded for return to shipper. Over 2,500 folded drums can be shipped in a box car that would hold only 300 rigid metal drums. Products shipped: fats, oils, greases, paints, soaps, dry powders, and many chemicals.—Chem Ind Wk, May 5, p31

. . . have a length standard in your own laboratory has been solved by Dr. Wm. F. Meggers, shown here with optical apparatus using the Hg 198 lamp (left foreground) that he developed at the U. S. National Bureau of Standards. The lamp contains 1 milligram of mercury of atomic weight 198, obtained by transmutation of gold in nuclear chain-reacting pile. Mercury glows when bombarded by high-frequency radio waves. Light given off has sharply defined wavelengths useful for length measurements.—Prod Eng, May, p197

. . . speed plant layout employs a table-top model and unique method of making blueprints. Production engineers at Kaiser-Frazer Co. lay out plant arrangement in detail with scale models glued to glass sheets. Glass sheets with models attached are then removed and inverted. Templets are laid over the outlines of models. Additional information is grease-painted directly onto the glass sheets and the models removed. The floor plan with equipment outlines in place is run through an Ozalid machine to make layout prints. —Aviation Wk, May 14, p21

How To Wind Filament Rayon for Package Dyeing Success

Correct winding is important in package dyeing of continuous-filament rayon. Central Yarn and Dyeing Co. employs Foster 75A winders to do its precision winding.

Here are the adjustments that give best results on the Foster winder:

• Delivery of yarn to package must be close. So a goose-neck guide point over the pressure roll is used instead of a button.

• Winding supply packages are cones. Dye tubes are 1⅝ in. in dia.

• Winding pressure must be light, evenly distributed, and uniform from spindle to spindle. For 150-den. yarn, a back pressure of 110 gm. at the start of the package is used. For 300-den., 120 gm. is used.

• Settings and adjustments must be the same on all spindles. Spindle speeds should be 1,100 rpm. for filament rayon.

• Package density should be checked regularly. Yarn tension should be kept low; 4-4½ gm. for 150-den. viscose and 8 gm. for 150-den. acetate at the start of the package and slightly higher tension for coarser deniers.—Textile World, May, p120

STUDY OF COLORS

The two men are studying colors proposed for 1952 Ford Motor Co. passenger cars using one-eighth scale models. The models are painted with actual Ford baked-enamel production finishes. Future Ford car body styles are not represented by the models.—Auto Ind, Mar 15, p69

Watch These Tricks

Watchmaking involves at lot of unusual materials, but two of the strangest are fresh bread dough and honey. At Hamilton Watch Co., dough is made fresh every morning and used by the girls at assembly benches to wipe dirt and grease from tiny watch parts.

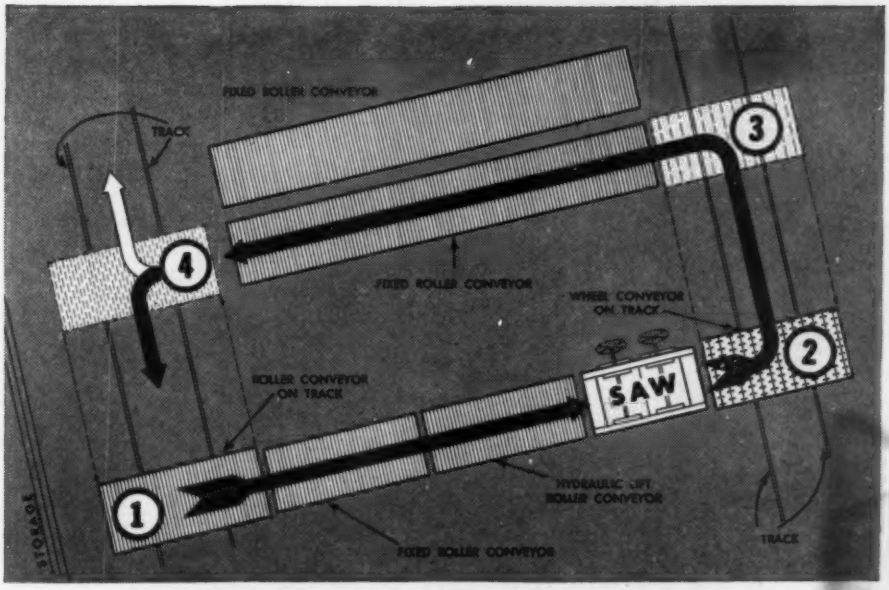
The honey—only a few drops—is poured in the little saucers in which ruby and sapphire jewels are kept. The honey keeps jewels from scattering and getting lost.

Another unusual material used is polonium. When static becomes troublesome and parts become hard to handle, a tiny bit of polonium on a wooden paddle is waved over the assembly bench. It ionizes the air and kills the static.—Am Mach, Apr 30, p131

Iron from Pickle Liquor

Possible process for producing large amounts of iron powder involves extraction of powder from waste pickle liquor and scrap aluminum. A reactor has been developed that leaves aluminum sulfate in solution and the iron freely suspended.

The powder is somewhat coarser and more abrasive than carbonyl iron powder. Its price should be less than that of imported sponge iron.—Iron Age, May 3, p112



"RUN-AROUND" CONVEYOR LAYOUT CUTS COSTS

Raw materials for Woodall Industries, Inc., up to 12 ft. long. Several lines of fiberboard consists of fiberboard sheets 4 ft. wide and run through a sawing operation so a direct flow of material was impossible. To save labor and boost production, the plant officials installed a V-shaped conveyor layout for flexibility. Here is how it works: Roller-bed car (1) is lined up with fixed roller conveyor. Fixed section acts as temporary storage for saw. Hydraulic lift keeps work at convenient level at saw. Sawed board moves onto skate-wheelbed car (2). Car lines up (3) with another roller conveyor, sends board back to first car (4).—Factory, Part 1, Apr, p58

New Coal-Mine Explosive

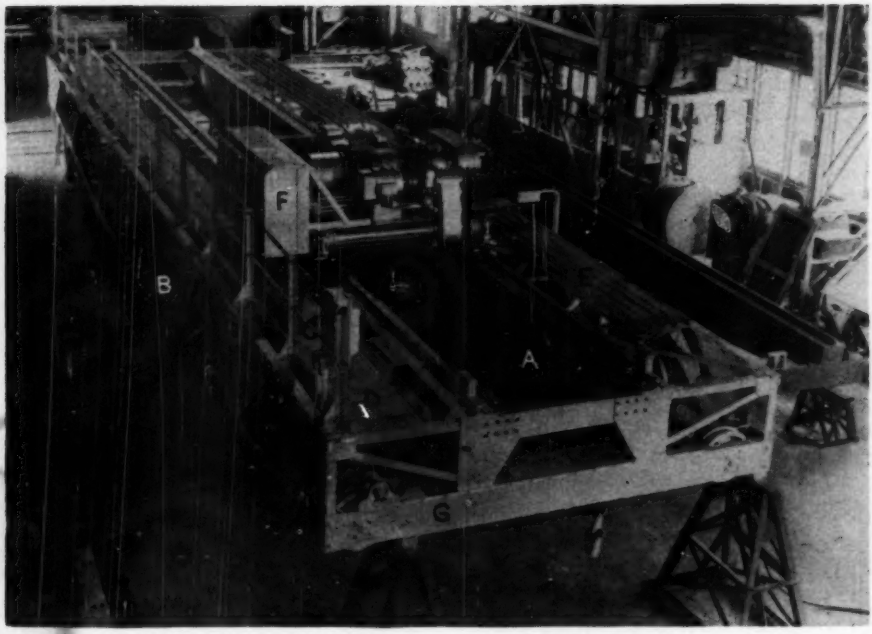
Mine operators try to avoid using dynamite to rip apart coal faces. Flame-throwing explosives are considered a hazard.

E. I. du Pont de Nemours & Co. has a new chemical blasting shell that breaks down coal by unleashing a pent-up charge of gases produced by a non-flaming chemical reaction.

The device is a steel tube containing a cartridge of ammonium nitrate mixed with other chemicals. At one end of the tube is a plug with electrical connections; at the other, a rupturable disc is retained by a perforated head.

An electric current starts the reaction; then heat melts the starter wires, breaks the electrical connection. Gas builds up in the tube until the disc ruptures. The gas (a mixture of about 50% steam, 30% nitrogen, and 20% carbon dioxide) rushes through ports in the head and breaks down the coal face.

Du Pont says each discharge will loosen up about 6 tons of coal. It is recommended for bituminous coal mining only.—Business Wk, Apr 28, p118



REPLACING STEEL with aluminum saved 57.5% of the weight in this . . .

Arc-Welded Aluminum Crane

Reduction in weight of an overhead traveling crane means that lifting capacity is increased. Comparable weights are 13,400 and 31,500 lb.

BELIEVED TO BE world's first aluminum crane, a 15-ton overhead traveling crane was fabricated by inert-gas-shielded arc welding by Provincial Engrg. Ltd., Canada. All structural parts usually made of steel are aluminum alloy 65ST, which has a typical ultimate strength of 45,000 psi.

The completed crane shown is made up of: crane girder solid web A, outrigger girder B, hand rail C, walkway D, aluminum contactor bus bars E, trolley hoist F, end-truck assembly G.

All welding was done with a 700-amp. inert-arc torch, using $\frac{1}{16}$- and $\frac{3}{32}$-in. tungsten electrodes. Most welds were $\frac{1}{4}$- and $\frac{3}{8}$-in. butt and fillet welds, made with filler metal from aluminum-alloy rod.

Intermittent welds were made throughout; welds were 5 in. long and were spaced on 12-in. centers. Cracks in weld craters were repaired by re-welding after the work cooled.

Welding current varied from 380–450 amp. It was supplied by two 300-amp. transformers hooked together in parallel. Total weld footage was 1,800 ft.

Argon consumed amounted to 25,000 cu. ft.

Flanges of main bridge girders were 1 x 12-in. extrusions. Webs were cut from ½ x 60-in. rolled plate, and web stiffeners were ⅜ x 4-in. bars. Girder components were tack-welded and placed in rotatable cradles for down-hand finish welding.

Distortion during welding was controlled by (1) conventional use of stiff-backs and spreaders, (2) chilling of welded metal by aluminum bars dipped in water, and (3) close control of metal temperature with temperature-indicating crayons. When crayon showed that base metal reached 400° F. at 4 in. from the weld, the weldor would move to a new, cool section.—Weld Eng, May, p26

High Rock Riprap Costs Cause Slope-Paving Study

High cost of riprap shipped from distant sources to dam projects has caused the U. S. Bureau of Reclamation to make a study of slope protection using material other than imported riprap.

Half of a test section on the upstream slope of Bonny Dam, Colorado, will be protected by asphaltic concrete of varying thickness. Rest of slope will have soil-cement paving.

A spot has been selected on the reservoirs where the test installation will be subjected to wind and wave action, fluctuating reservoir water surface level, freezing and thawing, and other rigorous service conditions. Engineers expect to gain full-scale performance records to determine the suitability and practicability of the tested materials as substitutes for rock riprap.

If the substitute paving materials prove satisfactory, a saving on freight costs for imported riprap of nearly $1-million can be realized on similar projects.—Eng News-Rec, Apr 26, p48

NEW NO-DRIP NOZZLE

Pour-type containers can have a nozzle that prevents dripping. The length of the nozzle and the lip construction prevent the liquid from dripping or running over the sides as with conventional nozzles. Upressit Products Corp. is manufacturing the nozzle for use on containers of a wide variety of liquids in the food, drug and chemical fields.—Mod Packaging, Apr, p135

Pack Makes Potatoes Visible

Potatoes are being retailed in prepackaged 5 and 10-lb. units. Net, mesh, fabric and kraft paper bags are common. Now polyethylene, colorfully printed, allows the buyer to see what she is getting.

The new package is a "square" or gusseted bag, with a heat-sealed bottom and a pre-sewed elastic top closure. Perforations in the bag provide ventilation.—Mod Packaging, Apr, p164

THIS UNUSUAL portland cement mixture is hosed on asbestos board to make a . . .

Poured-in-Place Roof Deck

The roof deck of a railroad station in Jersey City, N. J., is an aerated cement mix squirted out of a hose. The mix consists of portland cement, water and a chemical foaming compound that fluffs it up to density of 30 lb. per cu. ft.

It has the consistency of heavy cream, but sets up overnight to make a deck capable of taking an ultimate load of 250 lb. per sq. ft. Mixed in a plant, it consists of three bags of high-early-strength cement to 14 gal. of water, plus the foam compound. The chemical, diluted 1 to 25 with water, is blown through a series of fine screens inside a tank.

It is directed into a special mortar-type mixer in which the cement and water are already churned to a paste. The mixer is fitted at the bottom with a cylinder valve and hose connection for draw-off.

When the cement-water-foam mixture reaches desired consistency, it is unloaded from the mixer by opening a valve to let a vacuum suck the mix into a large steel tank. After the mixer is emptied, 40-lb air pressure is applied to the tank to blow the mix through a 2-in. hose.—Const Meth & Equip, May, p56

Humidified Combustion Air Reduces Boiler Slagging

Experiments at Detroit Edison Co. point the way to control fireside deposits. Combustion air for the underfeed, stoker-fired steam generator units is now humidified.

Purpose of air humidification is to minimize the volatilization of alkali salts by control of fuel-bed temperatures. The moisture produces an endothermic reaction (notably the gas-water reaction) in the fuel bed.

Moisture is introduced into the preheated air as saturated steam. Amount is 1.3% of the steaming rate as an average for a year and 2% in cold weather.

Results of the experiments indicate that humidification reduces SiO_2 in the deposit and nearly all other non-carbonaceous constituents. Amounts of Al_2O_3 and Fe_2O_3 drop off in superheater region but appear nearly independent of humidification in the economizer and air preheater.—Power, May, p71

Selvage Yarns from Spools

Unevenness of yarn tension and fabric thickness causes excessive needle breakage on warp-knitting machines. In some cases, needle breakage is caused by the selvage yarns being fed at the same rate as the warp yarns.

Here is what to do to correct this condition: A spool-holding plate is attached to the side of the frame. Spools of selvage yarns are placed on the holders and ends fed in individually. Needle bar width is made the same as the fabric width.—Textile World, May, p170

Steam Causes Embrittlement in Stainless Steels

Extent to which steam has an embrittling effect on stainless steel at elevated temperatures was determined by research conducted under sponsorship of U. S. Office of Naval Research. Bendability values were measured to gage the effect. Conclusions on the test were:

1. Steam is a powerful hydrogenizer of steel when contacting the metal at high temperatures.

2. All hardenable stainless steels are susceptible to embrittlement by the steam-metal reaction.

3. Type 410 bends a full 180° when quenched from a dry furnace, but fractures at 15-20° if exposed to steam during hardening.

4. Effect of steam in heat-treating atmosphere is realized even in a 1-min. exposure. The same embrittlement results if the steam is admitted in the final minute of the heat treatment.

5. Aging embrittled samples in hot glycerine causes hydrogen bubbles to develop and leads to recovery of bending properties; recovery is more rapid at high temperatures.

6. Recovery also occurs at room temperature, though more slowly. Type 410 shows little improvement for 1 month, but recovers completely in 2 months.

7. An "aging minimum" is indicated in the course of recovery, just as that established in pickling brittleness and with hydrogen embrittlement from electroplating.—Steel, Apr 30, p54

Sulfuric Acid Processes

An epidemic of new sulfuric acid processes is the result of the current shortage. Two new processes are attracting attention in the United Kingdom.

At Merseyside, England, a 150,000-ton plant is being erected; production will start in 2 years. Acid will be made from anhydrite. Raw gas, containing 7.5-8% sulfur dioxide, will be cleaned, cooled, and dried, then passed into a contact acid plant. A second product of the plant will be cement clinker.

In South Wales, the Steel Co. of Wales is installing a large-scale experimental plant for acid recovery from tinplate descaling wastes. Waste liquor will be mixed with coke and flash roasted to produce sulfur dioxide for use in an acid contact plant.

The latter process will reduce acid production costs only slightly. But it could cut "new" acid requirements for the tinplate industry by 75%.—Chem Ind. Wk, April 21, p25

KEEPS COOLER COOL

Liquid helium at −452° F. is chemistry's coldest element. To store it, Westinghouse Research Labs. has a version of a thermos bottle that keeps it from thawing into gas for 100 days. Spherical shaped container holds the helium and is immersed in liquid nitrogen.—Business Wk, Apr 21, p60

TECHNICAL SHORTS

Better Ice Cream—Quick freezing from all sides improves ice-cream quality. A continuous hardening unit, originally designed by Food Machinery & Chemical corp. for quick freezing of fruits and vegetables, freezes 300 gal. per hr. of ice cream in 48-54 min. at −30°F. It also controls the volume.—Food Eng, May, p72

Measures Tin Thickness—Hot-dipped tin coatings are measured at U. S. Steel to within 0.0000006 in. Geiger counter measures secondary rays reflected by steel beneath tin coating when tinplate is exposed to X-rays. Reflection is inversely proportional to tin thickness.—Prod Eng, May, p204

DOLLY TILTS 1-TON REEL

One man and an unloading dolly operated by compressed air handle what was four-man lifting job at Tinnerman Products, Inc. Dolly carries rewind reel of strip steel weighing 1 ton, tilts it 90° to lie flat on a conveyor. As rewind reel is filled, 5-in. compressed air cylinder moves dolly into vertical position and onto an arbor. When coils are slit, they are stripped from arbor and dolly returns to horizontal position.—Factory, May, p118

Resin Replaces Nickel—Synthetic pearl-chrome baked resin coating is replacing nickel for trim on some automobile parts. Aluminum in finely divided leaf form is color pigment. Instead of 170 lb. of nickel to plate parts for 40 automobiles, only 1 lb. of aluminum is needed.—Am Mach, Apr 16, p117

Keep Tires Inflated—Large off-road tires can be kept properly inflated by filling them with water under recommended pressure. Water does not seep through tubes as does air, so tires stay inflated. —Const Meth & Equip, May, p172

Pipe-line Welding—Pipe-line construction depends on quality welding. For example, Texas Illinois Natural Gas Pipeline Co. even goes so far as to specify exact number of beads, such as 31 beads on heavy 1⅛-in. wall, 30-in. river pipe. —Oil & Gas J, May 3, p88

No Painting Needed—Duquesne Light Co. has installed first aluminum cross-arms on a 66-kv. line. Purpose is to eliminate shut-downs previously necessary for repainting. Second advantage is that their lightness makes installation easier.—Elec World, Apr 23, p141

Strong Aluminum Rivets—New aluminum alloy XB77S has been developed by Aluminum Co. of America. Use is for rivets in large-size range with average shear strength of 38,000 psi. attained within 2 weeks after driving. Rivets are driven hot by hand pneumatic hammers. They may replace steel rivets in aluminum bridges and railroad cars.—Steel, May 7, p115

Highest-voltage Line—A 380,000-v. line now helps carry power from northern part of Sweden to industries in the south. Running 600 miles from north of the Arctic Circle to central Sweden, it transmits the highest voltage of any long commercial transmission line in the world.—Power, May, p212

Cuts with Gasoline—J. A. Browning, an instructor at Dartmouth College, has invented a gasoline-oxygen cutting torch. A special tip blends liquid gasoline and oxygen into a vapor, which is heated by torch flame. Torch is claimed to do as much cutting with 70¢ worth of gasoline as can be done with 100-cu. ft. acetylene tank.—Weld Eng, May, p45

Low-cost Ethylene Oxide—New process, developed by Scientific Design Co., oxidizes ethylene with air, uses no chlorine. It cuts production costs by at least 25%. Societe Naphtachimie will build such a plant in France.—Chem Eng, May, p71

Lubricates Glass Molds—Molten glass, blown against mold surfaces, may alternately stick and sag, thereby developing a "washboard" surface on the glass article. But treating mold with colloidal graphite dispersed in oil prevents this sticking.—Ceramic Ind, May, p78

Catches Drop Wires—Canvas sheet spread beneath warp when drop wires are being placed will catch loose wires that are dropped and keep them from falling on the floor. Wires caught by canvas do not have to be cleaned, thus time is saved.—Textile World, May, p176

Mold Impressions—Tricky way to stamp an impression on a foundry mold just after it has been moistened with blacking is to lay tissue paper on the mold and stamp through it. This prevents sticking. Paper burns off when mold is dried.—Foundry, May, p148

Slip-Proof Stair Tread—If wooden stairs become slippery because of dust and moisture, old wire screens fastened to the stair treads can correct the hazard. Accumulated dust can be hosed off readily.—Eng & Min J, May, p106

Mark Floors for Repair—One company cuts floor repair costs this way: Every time maintenance foreman or safety engineers finds a damaged piece of floor, he marks it with yellow crayon. The plant engineer on his tour notes trouble spots and gets out a repair order. Floors are repaired fast.—Factory, May, p142

WINDOW DISPLAY THAT SELLS

Night-time window shoppers at a lamp store in Beverly Hills, Calif., can light up groups of lamps or fixtures inside by a series of pushbuttons outside. Installation is made with low-voltage relay system. Pushbuttons operate relays that switch groups of lamps on and off.—Elec West, Apr, p83

Paint Vehicles—Australian paint manufacturers are investigating butyl titanate and other lower esters of titanic acid as high-temperature paint vehicles. Butyl titanate plus inorganic pigments result in dry, highly heat-resistant finish.—Chem Ind Wk, Apr 21, p22

Steel for South America—A steel mill to cost $25-million will be supplied to Colombia by the French steel firm, Delattre et Frouard Reunis. Another steel plant, also supplied by France, will be built in Peru within the next 2 years.—Mach, Apr 14, p555

Housekeeping Hint — General Electric Supply Co. in New York has a clever way to avoid habitually littered work benches. All benches must be shellacked once a month; that takes care of the job.—Electronics, May, p79

Miscible Packages—Godfrey L. Cabot, Inc., processes carbon black packed in S-polymer film bag. The bag is placed unopened into mixers and dissolves in the mix. Ease of handling and shipping is an advantage. GR-I rubber is also packed in miscible bags that prevent contamination.—Mod Packaging, Apr, p114

FIBER TESTS can tell which bales should be processed and can predict yarn strength.

WEIGHING LAPS shows total weight. Testing evenness within the laps requires a lap meter.

Cotton-Mill Testing Program

A routine testing program can help mill management men keep their products up to requirements. Details apply to wool, synthetic mills

ROUTINE TESTING FREQUENCY in the textile industry is a matter of concern to management. The textile industry in general does a small amount of testing in relation to the volume of material produced.

The required quality of the finished product determines the number of tests made on stock during processing and on the finished material. The problem of establishing the frequency of testing is an important one and should be given consideration before any sampling program is adopted.

Fiber Tests—Some mills use fiber test results as a basis for accepting or rejecting shipments. Sample sizes may vary from 10 to 100%.

One of the biggest of mill problems is neps. And the degree of fiber fineness is a factor in the formation of neps. One mill controls neps by rejecting all cotton that falls below 3.0 with a Micronaire test.

Check tests on blends during processing are usually made after the final drawing operation. Each new blend is tested only once or twice with three to six tests per sample. If the same blend is run continuously, then it is tested daily or every other day.

Picker Tests—Only two routine tests are made in the picker room—lap evenness and moisture.

Frequency of testing for lap evenness depend on several factors. Two important factors are the condition of the pickers and the evenness or uniformity required of the finished product. Each picker may be checked once a week. This test should be for the complete length of one lap.

Lap-moisture tests are made less frequently. Moisture tests are made in the picker room to control the actual amount of stock in the lap.

Card Tests—Frequency of nep counts depends on the type and grade of yarns and fabrics produced. Industrial fabrics and yarns require few, if any,

nep counts. Mills producing better fabric grades make counts daily.

Sliver size tests should be made daily on each weight of sliver being produced. The number of cards sampled should be a sufficient number so that each card is checked every 2 to 4 weeks. Sampling should be arranged so that no one card is resampled until all cards have been checked.

Drawing Tests—The drawing frame is the key point for control in the card room. All deliveries of finisher drawing should be checked for sliver size daily. Some mills test all deliveries on each shift.

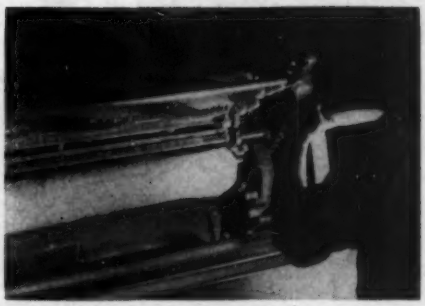
Sliver evenness should be tested at the drawing frame. The usual sampling procedure is to select samples on a definite pattern so that all deliveries will eventually be included within a period of 1 month.

Roving Tests—Roving tests should be made daily on one or more shifts. For mills using the slubber, intermediate, and fine frames or speeders, it is usually only necessary to test the final-process roving on a routine basis. Other roving processes are tested only as a spot-check measure.

If the evenness of the drawing sliver is well controlled and stays constant, it is not necessary to sample roving for evenness testing as frequently as sliver. The roving frames should be in good condition.

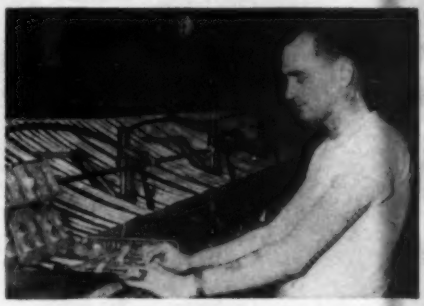
Yarn Tests—All different yarns should be tested daily for strength. Sample size should depend on the quality of material produced and requirements of the finished yarn. The number of samples taken varies from 10 to 50 per yarn number, with from one to five breaks made from each bobbin.

Spindle speeds can be checked daily by means of a stroboscope. In cord and thread mills, it is advisable to test the ply and cable twist daily since those types are sold against a close specification.—Textile World, May, p99



***SLIVER-SIZE TESTS** should be made daily on a testing machine. Sight testing can detect only gross irregularities.*

***DRAWING FRAME** can be used to control sliver size if adequate tests are made at this process. Frame is key point for quality control.*



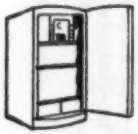
***ROVING-FRAME** tests are not so important; emphasis should be on the final-process roving, not on the slubber.*

DOW caustic soda

for your processing needs

In every industry where caustic soda is used—soap, paper, chemicals, textiles, petroleum, metal, and many others—Dow is a leading supplier of this *workhorse* chemical. And there's a reason. Process men know every shipment of caustic will meet the high standards of quality that Dow has maintained for over fifty years. Dow caustic is produced for export markets in solid and flake forms. Write for additional information about caustic and more than

fill your chemical requirements from these Dow products



plastics Styron (Dow polystyrene) is a thermoplastic material used by manufacturers to cut production costs and bring added sales appeal to such items as electric refrigerators, camera cases, and automotive interior parts. Other Dow plastics include: Ethocel (Dow ethylcellulose) a tough plastic with excellent shock resistance; Saran for extruding and weaving into seat covers and screens; Saran film for packaging.

glycols These versatile Dow chemicals are in great demand in many industries. Here are a few of the jobs they are doing: a moistening agent in foods and tobacco; a plasticizer for films; a freezing point depressant in automotive and industrial antifreezes; a solvent and carrier in printing inks; a coupling agent in textile soaps, as well as in various cosmetic preparations. More details about Dow glycols on request.

solvents Dow is a source of many types of solvents. Dow chlorinated solvents are regularly used in industry to dissolve oils, fats, waxes, gums, resins and other materials. In industrial cleaning and formulating products such as paint removers, they bring fast action and are nonflammable. Check this list of other Dow solvents: Dowanol glycol ethers, polyglycols, and alkanolamines.

dowicide products Manufacturing processes today can be guarded against attacks of mold and bacteria by the use of Dowicide industrial germicides and fungicides. These products protect materials against micro-organism attacks in processing paper, textiles, leather, lumber, adhesives, petroleum and disinfectants. They are produced in both oil and water-soluble types.

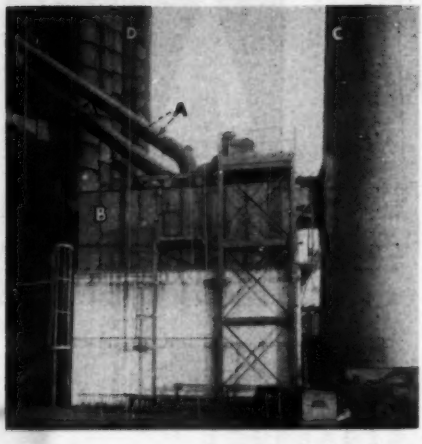
THE DOW CHEMICAL COMPANY, *Midland, Michigan, U. S. A.*

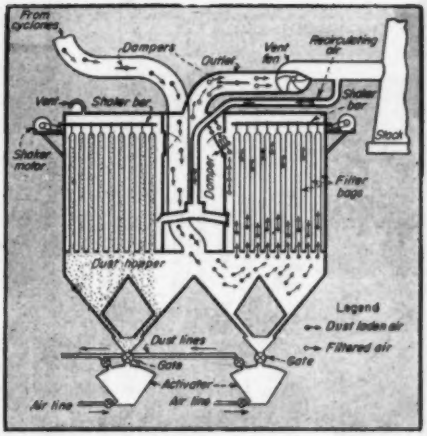
DOW CHEMICAL OF CANADA, LIMITED, *Toronto, Canada*

DOW

CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE





FILTER SAVES 25 TONS COAL DUST DAILY

Bag filters at a power plant of Consolidated Edison Co. of New York, Inc., are credited with saving 25 tons of coal dust per day. Dust is fed back to the station boilers. Filters, installed at rear of pulverizer-mill house (left), pick up dust from air vents A that discharge to compartment B containing bags. Trapped dust falls into hoppers below and is blown to fuel bins. Cleaned air is passed to atmosphere through a 300-ft. stack C. Two compartments are shown; while shaker bars work in one, it is closed to air flow. Former spray towers are at D.—Elec World, May 7, p107

Lightweight Aggregate From Phosphate Slimes

Analysis of slimes from the phosphate washing plants of American Agricultural Chemical Co., Polk County, Fla., indicates that these slimes could be used for making lightweight aggregate as well as glass fibers.

Processing the slimes on a commercial scale will involve mixing in a pugmill followed by extrusion with a cluster die to give different sizes. Extrusion will be followed by drying and the dried product sent to storage or to a rotary kiln for further firing. Aggregate will have a weight of 30 lb. per cu. ft.

The material begins to bloat at 1750° F. Firing at sizes ½ to $\frac{5}{16}$-in. dia. is satisfactory. No separation is necessary, but smaller sizes were found to lack strength.

Lightweight glass fibers can be made by the addition of limestone or dolomite. Tests indicate that a good magnesium aluminum silicate glass could be made with about 75% slimes and 25% dolomite.—Eng & Min J, May, p92

Jet Blade Anti-Icing

Blade heating method for combating the ice hazard on the initial stages of turbojet compressors has been developed at A. V. Roe Canada Ltd.

The blade heating element is built up on a mica form. Resistance ribbon is wound on first, then insulated with glass-thread helical windings. Ceramic material is used to impregnate the assembly. The blade is cast around the assembly.—Aviation Wk, May 14, p32

Production Upstairs—Maintenance Downstairs

The problem of maintaining plating equipment without interrupting production was solved at Federal Telephone & Radio Corp. by a two-level layout.

All production equipment is located on the upper level. And all service facilities are located in a basement of equal area immediately below. This arrangement does away with all overhead services and bulky ventilating ductwork.

In the basement, maintenance men can get at the facilities at any time without hindering or tying up production operations. Most of the maintenance, except minor servicing of production equipment on the upper level, is done in the lower level.

Pipelines for cold-water supply, drainage, compressed air, steam supply, and condensate return lines are all suspended from the floor beams within a few feet of the basement ceiling. Blowers are located on foundations at basement floor level.

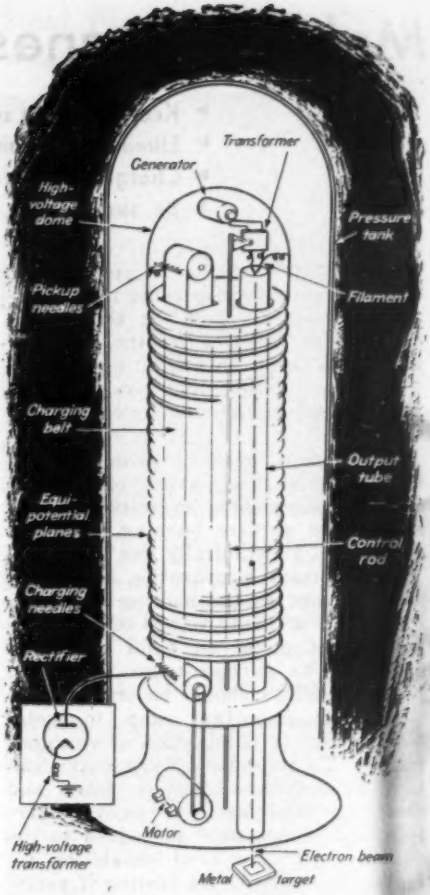
To minimize corrosion FTR used corrosion-resistant materials and design on both upper and lower levels.—Factory, May, p74

Truck Trailers Go by Rail

Overnight deliveries between Chicago, Ill., and St. Louis, Mo., motor carriers are now being made by shipment of loaded trailers on railroad flat cars.

In each yard, a cement ramp spanning the width of two tracks is used for backing the trailers onto the flat cars and driving them off. Gaps between cars are bridged with steel plates, so trailers can be driven over full length of string of flat cars.

The cars are standard flatcars, long enough to hold two 26-ft. trailers. Special moorings secure trailers in transit.—Fleet Owner, May, p79



DISPLACES ATOMS IN METALS

Statitron, a new device developed by North American Aviation, Inc., can build up forces that cause failure, work-harden aluminum alloys, harden non-heat-treatable alloys, alter physical properties of metals. It displaces atoms by electron beam. Charging needles build up electrostatic charge on vertical belt, which transfers it to dome where apparatus accelerates electrons downward to bombard target. Released charge is 60,000-billion electrons per second.—Am Mach, May 14, p134

Melting Magnesium Alloys

- ▶ Keep accurate records of composition of metal in stock
- ▶ Eliminate contamination, such as by sandblasting scrap
- ▶ Charge in proper order and control temperature closely
- ▶ Be sure to stir, degas, flux, refine grain, and reheat

TOO MANY FOUNDRIES make poor-quality magnesium castings because their melting practices are bad. So the Aluminum Co. of America for the past few years has been investigating magnesium-alloy melting and now presents these conclusions and recommendations:

A scheduled melting procedure can reduce metal loss, avoid off-analysis composition, reduce excessive use of flux, lessen surface burning, and produce metal substantially gas free.

Proper metal preparation is perhaps as important as the melting operation itself. An accurate record of the composition of metal on hand should be available to furnace-room personnel. Different alloys should be segregated.

Another important step in metal preparation is elimination of contamination. To minimize silicon contamination, all defective castings, gates, and risers are sandblasted to remove adhering sand before they are added to the charge. All core sand should be removed by breaking the casting if necessary.

Best Melting Practice

Ingredients of each charge should be carefully weighed and recorded. Best melting practice is to use a molten heel of at least 10% of pot capacity from preceding melt to facilitate melting newly charged metal of the same alloy.

Burning metal should be extinguished with flux. Preferred flux is Dow No. 230. Wet flux should be avoided by keeping the drums covered.

Charging order is first primary ingot and any metal for which composition adjustments are to be made. Operating scrap is added after the molten bath has been built up; this practice permits controlling composition of the melt. To avoid spilling during stirring and degassing, metal level should be kept 3-5 in. below the top of the crucible.

How To Add Alloys

Metal temperature is brought to 1200-1250° F. before alloying materials, if necessary, are puddled into the melt. Large amounts are best added in a basket. Beryllium addition to obtain a content of 0.0002% is made at this time.

After additions are made, the melt is stirred to a rolling motion to insure thorough mixing. Finally, the metal is skimmed and the chemical analysis made.

The melt is degassed at 1220–1260° F. by adding nitrogen with a pipe extending within 6–8 in. of the crucible bottom or above the sludge line. Degassing takes 30 min. Then the melt is skimmed and covered with a thin layer of Dow No. 30 flux preparatory to transferring the metal into smaller pouring crucibles.

After pouring crucibles are filled, they are brought to 1320–1360° F. in a small furnace and Dow No. 310 flux is sprinkled on the metal and allowed to melt. Then the metal is stirred. About

1 % flux by weight is usually enough. When flux refining is completed, a thin layer of Dow No. 310 should be sprinkled over the top. Sometimes degassing by chlorine gas is necessary.

After degassing, grain is refined by (1) superheating the metal to 1750° F. or (2) carbon inoculation, such as by adding solid chlorinated hydrocarbons. The metal is then brought to desired pouring temperature.—Foundry, May, p94

Relative Humidity Affects Processing of Wool Fibers

Proper relative humidity is an important factor in processing wool fiber. Effects of humidification on wool-processing procedures are:

Picking—An oil emulsion is applied to the material as it starts through the picker. Oil acts as a lubricant and the water provides the basic regain. From here on, relative humidity must be controlled.

Carding—Best conditions for carding range from 65% relative humidity for fine wools to 70% for coarse wools. Controlled humidity eliminates the variable moisture element in the total weight. Static electricity is eliminated.

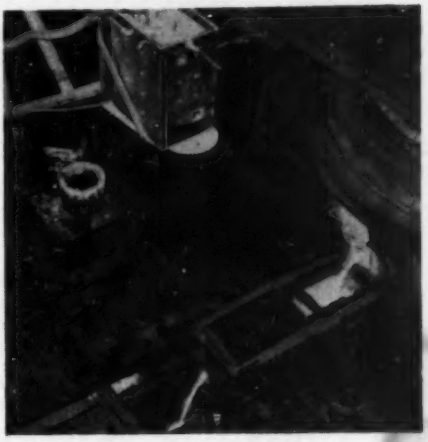
Spinning—From 50 to 55% relative humidity permits sufficient surrender of moisture to cause the fibers to contract slightly, curl, and thus cling more firmly, fiber to fiber. The result is an evenly drafted, smooth yarn.

Pressing and Winding—A relative humidity of 50-55% will preserve maximum strength and resiliency in the processes prior to weaving.

Weaving—Elasticity and strength are essential in weaving. Uniform humidity of 60-70%, depending on the fabric structure, prevents undue contraction or stretching of the warp and produces cloth weights that match specifications.—Textile World, May, p118

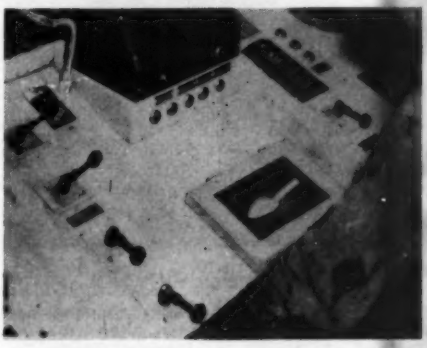
Steel Pouring Televised

What the Camera Sees . . .



. . . at Babcock & Wilcox Tube Co. In continuous steel casting is that mold is filled to exact level. Purpose is to get sound billets without spongy spots or air inclusion. Camera with long focus lens is suspended above mold.

What the Operator Sees . . .



. . . at control panel is close-up picture of metal level. Formerly, a man had to be stationed at mold top to watch pouring. Hazard and discomfort were bad. Camera maker is Diamond Power Specialty Corp. —Steel, Apr 23, p78

How Powdered-Coal Flyash Can Pay for its Disposal

Flyash formed from burning pulverized coal and carried by flue gas to the stack must usually be removed because of city ordinances and disposed of satisfactorily. The operation is costly—from 66 to 85¢ a ton. But the flyash can be used for quite a few jobs.

One is in making concrete. U. S. Bureau of Reclamation expects to save more than $1-million on cement alone for Hungry Horse Dam (McG-H Digest, Sept '50, p30) by using flyash. Cost is $11.50 a ton, of which $10 is paid for transportation.

Flyash in concrete improves workability, reduces heat of hydration, and after 14 days equals or betters compresive strength of concrete with no flyash. Late strength of flyash concrete exceeds that of portland-cement concrete, and dry shrinkage of concrete with not more than 10% flyash is less than with cement concrete.

Next important use is in asphalt road construction. Others include red vitrified brick, insulating cement, soil-stabilizing agent, building block, impregnating wood, foundry sand, blasting sand, bleaching clay after acid leach, raw material to make portland cement, heat-resistant paint filler, in compounding recording disks, and in asbestos cement.—Power, May, p87

CUTS CANDY QUICKER

Portable electric saw cuts slab-cooled bar candy four times faster than manual method at Walter H. Johnson Candy Co. Saw was modified by adding a plow to guide saw under candy and prevent blade contact with metal cooling slab. Blade is smooth-edge disk rotated clockwise. One man can cut slab 48 ft. long and 3 ft. wide in less than 3 min.—Food Eng, May, p11

Holds Work for Machining

New kind of cellulose tape (Scotch Tape Tissue No. 400) is finding ready acceptance in machine shops. It has adhesive material on both sides of the strip, which allows it to bond both sides.

Westinghouse Electric Corp., for instance, is using it to hold non-magnetic parts on the magnetic table of surface grinders. When coolant is to be flowed over the work, the tape must be trimmed to fit part exactly and shellac applied around the edge of the tape.

Another use is to tape soft-rubber parts to be machined, against the end of a soft-steel bar held in a lathe chuck. —Am Mach, Apr 16, p143

Jet Blades Flight Tested

EMI Factories Ltd., England, supplied equipment for the first strain testing of jet turbine blades in flight.

The test was carried out as follows: Electrical resistance elements were built into the turbine blades and electrical connections made to a radio transmitter in the aircraft by special mercury slip-ring contacts.

Any strain set up in the operating jet engine appeared as electric signals transmitted to the ground. Signals were recorded on magnetic tape for study.—Aviation Wk, May 21, p33

One-Use Gelatin Capsules Find New Applications

Gelatin capsules have graduated from pharmaceutical preparations to controlled dispensing of margarine colors, food flavors, cosmetics, lubricating oils, and adhesives.

The capsules are available in a variety of shapes and sizes, are resistant to chemical attack, and may be made in attractive colors. In addition, the containers are capable of being produced and filled at extremely high production rates.

• California Oil Co. packages a volatile ethyl ether fluid in gelatine capsules. The fluid is injected into automobile intake mainifolds for quick starting in cold weather.

• International Harvester Co. puts measured quantities of condenser-fan motor lubricant in gelatin capsules. Each capsule contains sufficient lubricant for a year's service.

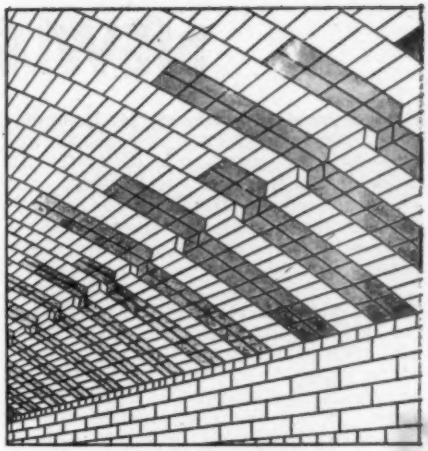
• Southern Entomological Co. packages a larvicide for combating mosquitos. Another capsule contains a chemical that will destroy land crabs in their holes.

• Small household items are packed with capsules containing an adhesive. the adhesive permanently fastens the item to a wall.

• Sun-tan oils are packaged in gelatin capsules. Each capsule holds sufficient oil for one application.—Mod Packaging, Apr, p148

Have You Noticed . . .

. . . our new layout. Last month we changed type on our department titles. The new type is designed for easy recognition. This month we have made our type columns narrower and shorter. These changes have been carefully thought out to help you, our reader, get the most out of the McGraw-Hill Digest with the least effort.



BASIC BRICK with integral steel plates are alternated with silica brick in . . .

Zebra Openhearth Roof

Increased steel production and lower cost have been made possible by development of the zebra-type furnace roof, which incorporates silica and basic brick in alternate courses. The silica brick insures a strong, stable roof, while the basic brick offers superior resistance to chemical attack and protects the silica brick.

Since July 1950, the zebra roof has gained popularity faster than any other construction in openhearth history. General Refractories Co. has found that at least 48% of U. S. ingot producers are using zebra roofs. In 17 plants of 11 companies, zebra roofs are standard in every furnace.

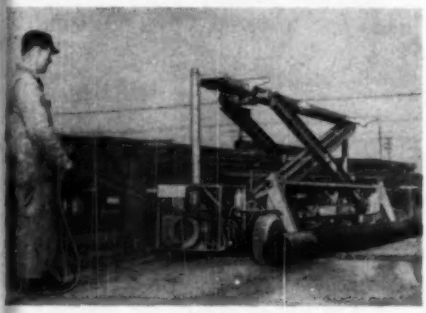
In 8 of the 17 plants, the increase in number of heats per campaign varies from 0 to 41.2 % and averages 19.4%. In several plants, this increase is obtained despite either no patching or smaller patches. In one plant, the number of patches for 6 months dropped from 35 to 2. Backwall and bottom repairs are reduced—Steel, May 7, p126

NEW EQUIPMENT...

Curved Insulating Blocks—Hydrous calcium silicate blocks are now curved and available for vessels up to 60-ft. dia. They are 18 in. wide, 1-6 in. thick, and able to insulate effectively to 1200° F. Uses include pipes, tubes, and tanks.—**Owens-Illinois Glass Co.**—Power, May, p160

Primer Inhibits Rust—Synthetic primer for spraying or dipping clean ferrous or aluminum castings is claimed to withstand exposure for over a year without appreciable corrosion. It bakes or air-dries. It can be cured with top coat in one-bake operation.—**James B. Sipe & Co.**—Foundry, May, p209

Vinyl Latex—Dow Latex 744-B is intended for use in paper, textile and paint industries. It serves as functional coating material and as pigment binder. It increases resistance to moisture, chemicals, and grease in paper coatings, paints, fabrics, and wallboard.—**Dow Chemical Co.**—Chem Eng, May, p200



HOW TO LOAD BIG PIPE

Hydraulic pipe loader, made by Republic Supply Co., can lift 4,000 lb. to 11½ ft. Operator controls loader by cords attached to four-way valve. Only 17 sec. are required to place one or more pipe joints on a truck or gondola. Loader forks are here at ground level, ready to lift pipe to hoisting platform.—Iron Age, Apr 26, p104

Portable Compressor—Improved 105-lb. portable air compressor is powered by either diesel or gasoline engine. It has zero pressure retractable third wheel, underslung spring-mounted undercarriage with 15-in. trailer tires, and unit core radiator with pressure cap to prevent boiling.—**Worthington Pump & Machinery Corp.**—Ceramic Ind, May, p106

Insulates Fittings—Molded insulation fits around ells, tees, and 45° pipe connections. Insulation combines easy application, neat appearance, and low thermal conductivity. It is molded from Fiberglas, and comes in pipe sizes ½-8 in.—**Birma Products Corp.**—Eng News-Rec, Apr 26, p133

Cuts Bar Stock—Oxy-acetylene cutoff machine automatically performs complete cutoff and head retraction. Bars are fed by rolls to the cutter. Slag and scrap are ejected by chute.—**Linde Air Products Co.**—Am Mach, Apr 30, p154

Controls Fan Output—Vane control regulates fan output from 15-100% of full load. Fan or motor speed do not change; instead, vane control changes spin of entering air to modify fan pressure. Four models are available.—**Westinghouse Electric Corp.**—Elec C&M, May, p111

Looks Like Plating—Metallic bronze lacquer in 15 shades looks like plated metals. Colors are light-fast, nonfading, and lustrous. No dyes or bronze powders are used.—**National Lacquer & Paint Co.**—Prod Eng, May, p221

Electrical Steel Improved—New oriented steel is available for wound transformer cores. Made in two grades, it has exceptionally low core loss and high permeability. Both grades are supplied in coils from 1-30 in. wide and 0.012 in. thick.—**Armco Steel Corp.**—Elec World, Apr 23, p158

. . . AND MATERIALS

High-capacity Sifter—All-metal sifter for dry free-flowing granular products is easily disassembled and reassembled. Counterbalanced drive mechanism gives gyratory motion of 1½-2½ in. to sieves. Unit is designed for stack of three, four, or five sieves; number depends on product, required capacity, and screen mesh. —**Allis-Chalmers Mfg. Co.**—Food Eng, May, p103

Small Centrifugal Pumps — All-rubber pumps are powered by 1/200-1/35 hp. electric motors. Capacity ranges from 504 gph. at 2 ft. head 78 gph. at 10 ft. head. Both corrosive and non-corrosive liquids can be pumped.—**Gorman-Rupp Co.**—Hardware Age, May 3, p12

Vertical Pump—Type VLT pump has a mechanical seal and so is especially well suited for handling butane, propane, gasoline. It is built in 1-bbl. size, is ideal for sump or tank-pump service, and has working pressure to 350 psi.—**Byron Jackson Co.**—Oil & Gas J, May 3, p140

Quick Make and Break—Plug-in circuit breaker for 15- to 20-amp. service features quick-make, quick-break operation and thermal-magnetic protection. Thermal action opens breaker in case of overload, while magnetic action opens breaker in case of short circuit.—**Trumbull Electric Mfg. Co.**—Elec West, Apr, p38

Dryer Controls Tension—Driver equalizer applies tension in any desired amount on cloth. Both fabric faces are subjected equally to blowing and suction of hot air. Production rate is 3,000 lb. in 8 hr.—**Grand Rapids Textile Machinery Co.**—Textile World, May, p150

Tractor Transmission—Combination auxiliary tractor transmission enables farmers to expand productive capacity of tractors. Unit provides tractor with 12 forward speeds, 3 reverse gears and 3 power-takeoff speeds.—**Sherman Products, Inc.**—Am Auto, May, p52

DOUBLES ABRASIVE-BELT LIFE

Model 61 backstand idler wheel for abrasive belts is claimed to double belt life in operations where glazing normally occurs. Wheel is serrated rubber. Serrations cause controlled breakdown of belt bond, thereby exposing fresh abrasive. The manufacturer, Carborundum Co., reports that it reduces rejects and gives better finish.—Am Mach, Apr 30, p138

Portable Space Heater—Fully automatic, oil-fired portable steam space heater is suitable for heating large confined spaces where men are working. Fuel consumption is 1½-gal. No. 2 fuel oil per hr.—**Quiet Automatic Oil Burner Corp.**—Am Builder, May, p130

Heat-seal Overwrapper—Sealer can produce an over-all seal on soft plastic films such as polyethylene, Pliofilm, and Saran. It also seals films such as MST cellophane and acetate.—**Package Machinery Co.**—Mod Packaging, Apr, p152

Prepares Plate Edges—Device flame-cuts a single or double bevel accurately, with or without a land. Free-floating carriage permits bevel cutting over uneven surfaces. Device may be mounted on any gas cutting machine equipped with a 3-in. square torch bar.—**Air Reduction Sales Co.**—Marine Eng, May, p108

NEW EQUIPMENT (Cont.)

Copper Brazing Paste—Cubond paste makes joints stronger because of more sluggish molten brazing metal. This improves filleting of joints and avoids notch effect. Clearances to 1/32 in. can be filled, thereby eliminating some silver solder jobs.—**Glidden Co.**—Elec World, May 7, p138

Gluing Machine—New unit applies uniform glue coatings to flexible or rigid materials up to ⅜ in. in thickness and 46 in. wide. Glue tank is hermetically sealed and thermostatically controlled, insuring uniform heat distribution.—**Potdevin Machine Co.**—Paper Ind, Apr, p88

Closes Bins Tightly—Double-closure bin valve is completely dust tight. It consists of two rubber sleeves joined by steel collar. Rotating collar by pulling a cable wrapped around it twists rubber sleeves and seals opening.—**Stephens-Adamson Mfg. Co.**—Food Eng, May, p104

Surface-active Agent—Synthetic anhydrous non-ionic agent in liquid form serves as detergent, wetting agent, emulsifying agent, and dispensing agent. Product features chemical stability and retention of activity in the presence of acid and alkali, metallic salts, and very hard water.—**General Dyestuff Corp.**—Textile World, May, p160

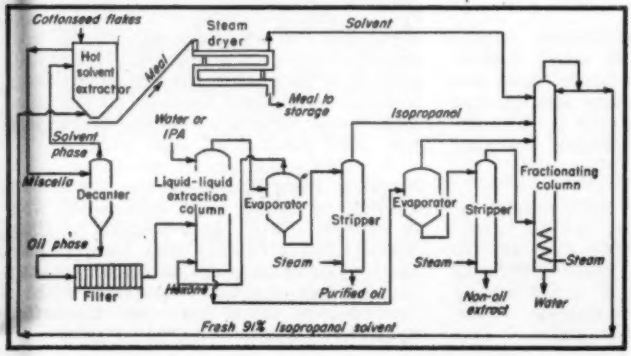
Replaces Screws, Bolts—Thumweld is a small permanent fastener for rapid assembly of sheet-metal products, such as access plates, radio parts, metal housings. Inserted in 3/16-in. hole, it is snapped shut to expand anchor points on the inner side of assembly.—**American Shower Door Co.**—Prod Eng, May, p216

Protractor for Circular Saws—Operator can cut any angle accurately and easily with protractor. Device is adaptable to practically all portable electric saws.—**Black & Decker Mfg. Co.**—Ind Dist, May, p116

Protects Money, Papers—Combination chest and safe unit protects money and documents against theft and fire. Safe is fire-resistive and chest is burglary-resistive. Both are combined in a reinforced concrete block.—**Herring-Hall-Marvin Safe Co.**—Am Business, Apr, p61

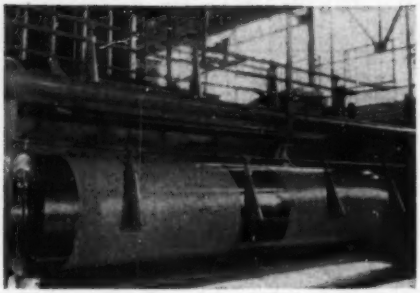
Dispenses Steel Strap—Electric dispenser speeds up warehouse or shipping room strapping with steel band. It uncoils strap along the floor so operator can cut it off with hand shears.—**A. J. Gerrard Co.**—Factory, May, p162

Tiny Amplifier — Airborne amplifier weighs 2 oz. and has 35 parts. Equivalent amplifiers have as many as 240 parts and weigh 28 oz. Entire unit is designed to be replaced in the event of tube or component failure.—**Bendix Aviation Corp.**—Aviation Wk, May 21, p39



EXTRACTS OIL

New solvent extraction process, developed by Texas Engrg. Experiment Station and Cotton Research Committee of Texas, uses isopropanol to extract cottonseed meats. Advantages include: uniform-quality oil, high oil yield, meal high in nutritional value. Commercial process is planned from research project. — Chem Eng. May, p226



PROTECTS COATING MACHINE

Dependable fire extinguisher system for coating machine at Synthane Corp. has been installed by Walter Kidde & Co. Machine impregnates different types of paper and fabric with synthetic resins in alcohol solvent. The open solvent tank is the fire hazard, but any fire is quickly smothered by carbon dioxide from nozzles aimed at bath. Link-type heat detector actuates CO_2 release.—Paper Ind, Apr, p51

Line Grind Band—Grinding operations can be done on Contourmatic band machines with a continuous band tool. It is a tough alloy band on which abrasive matrices are welded. Band is made in two types and two grit sizes.—**DoAll Co.**—Iron Age, May 3, p35

Pocket-Size pH Meter—Probe unit permits on-the-spot determinations of pH. Accuracy of 0.1 pH is obtainable. Batteries last 1,300 operating hours.—**Analytical Measurements Inc.**—Eng & Min J, May, p124

Dynel Work Clothing—Garments made of dynel staple is reducing clothing replacements in acid and caustic plants by 75%. Dynel garments have lasted several months in chemical plants where cotton clothing lasted only 1 day.—**Chem Wear, Inc.**—Chem Eng, May, p185

Makes Springs—Attachment converts drill press into spring-making machines for wire of 8-28 gage. Spring OD can be varied from 3/16-⅝ in. One bolt fastens device to drill press.—**Cycloid Corp.**—Steel, May 7, p172

Times Industrial Operations—Class 9050 type R pneumatic timing relay times machine-tool cycles, conveyor systems, similar industrial operations. Range is from 0.2 sec. to 3 min., and accuracy is within 10%. Operation depends on air transfer through restricted orifice between two chambers.—**Square D Co.**—Elec C&M, May, p107

Submersible Pump—Self-priming deep-well pump is water cooled and water lubricated. No jets, rods, or shafts are required. Capacity is 70-ft. head with well diameters of 4 in., or more.—**Fairbanks, Morse & Co.**—Cons Meth & Equip, May, p128

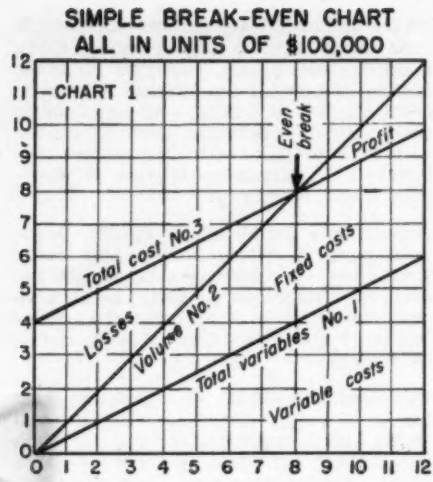
Hydrogenator—Unit is designed for quick, thorough dispersion of gases and solids and is individually built for each application. Radial propeller agitator gives rapid overturning and turbulent motion in liquor, thereby entraining both hydrogen and catalyst.—**Struthers-Wells Corp.**—Oil & Gas J, May 3, p141

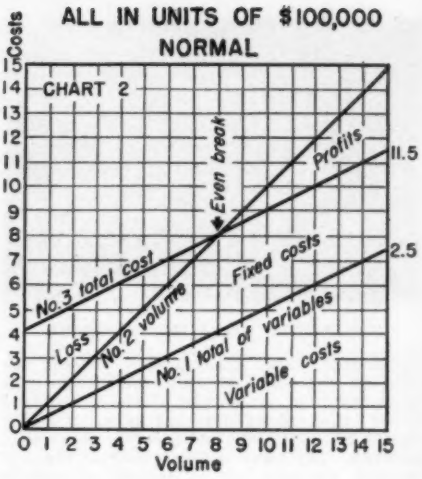
High-vacuum Gaskets—Synthetic-rubber gasketing material has low vapor pressure, therefore is ideal for high-vacuum operation. It is claimed to have lower outgassing pressure than any other commonly available gasketing materials.—**Eastman Kodak Co.**—Chem Ind Wk, May 5, p25

Welding Gantry—Movable gantry for submerged-arc welding equipment can move at 5-320 in. per min. and can be used to weld seams 10 ft. long at right angles to gantry track. Vertical adjustment accommodates 12-ft. dia. vessels. Gantry moves on railroad track.—**Reed Engrg. Co.**—Weld Eng, May, p45

READER SERVICE

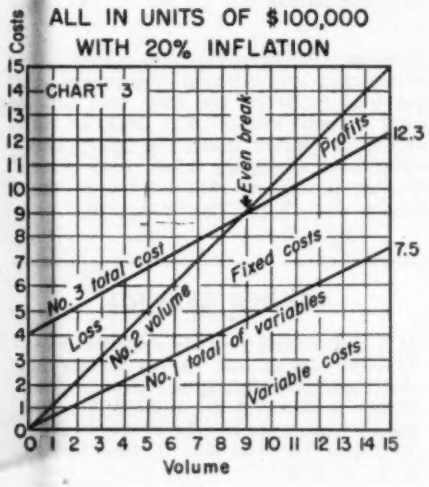
As a special service to our subscribers, McGraw-Hill Digest will furnish without any charge additional information about any new product or technical development described. Address your letter to: The Editor, McGraw-Hill Digest, 330 West 42nd St., New York 18, N. Y., U. S. A.





Find Your Break-Even Point

When prices and costs go up, the break-even point also moves ahead and so some correction for price level must be employed if the break-even chart is to predict correct profit or loss at any volume



THE BREAK-EVEN CHART forecasts a company's probable loss or profit at any volume of business below or above its average. But now a new element—inflation—enters the chart's application. Some means of correcting for price level must be employed.

To illustrate the problem, a company might have said, 3 years ago, "Our normal operation is at the rate of $1-million a year. Our break-even point is just below $800,000 a year. When we handle $1-million a year at normal cost ratios, our profit is $100,000. From these figures plotted on our break-even chart, we find that if our volume can be boosted to $1.2-million we will earn $200,000 at that level."

The present problem is: Why a company in 1948 in such a situation cannot

now use the same formula or the same chart or the same figures.

Let's start with the simplest break-even point chart (Chart 1), assuming that each division line is $100,000. Assume also 50% cost varying with volume (material, wages, discounts, commission). Assume also $400,000 in fixed expenses at average level of operation.

Diagonal No. 1 records mounting variable cost as volume mounts. Diagonal No. 2 is the volume line 0 to $1.2-million. Diagonal No. 3 is determined by measuring up $400,000 above zero at the left and above total variables of $600,000 at the right. Connecting these points establishes total cost.

The break-even point is at the intersection of total cost and total sales. Above the break-even point, profit grows rapidly. Losses climb even faster. The firm will earn $100,000 when sales are $200,000 above the break-even point—or 10% on $1-million volume.

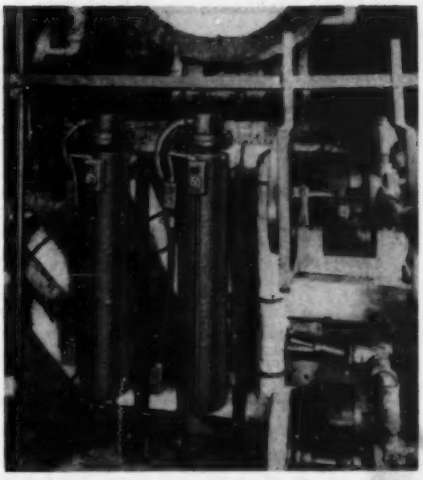
Let's assume (and correctly) that under inflationary conditions all costs and all prices advance 20%. The $1-million volume becomes $1.2-million. The variable costs are still 50% of selling price, now $600,000 compared to $500,000 when volume was $1-million. Fixed charges are now $480,000 instead of $400,000. Profit is $120,000 on $1,200,000, still 10%.

But now what is the profit on $1-million volume? Fifty percent of $1-million for the variables is $500,000, plus new fixed costs—$480,000 (the old $400,000 plus 20%). Total cost is now $980,000.

Under the new inflation the company makes only $20,000 on the million—2% instead of 10%. The break-even point has moved from $800,000 to just below a million. Note the break-even point has gone up 20%.

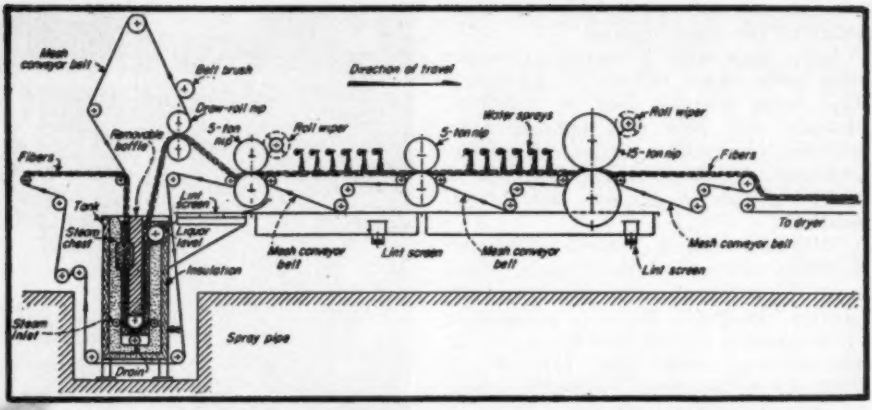
Therefore, the million a year is not the million a year of 3 years ago. Dollars of volume must increase as fast as selling prices advance. The break-even point is really in units, not dollars. Working of the formula is not destroyed. The dollar break-even point just moves up as costs and prices increase. Excess volume above break-even point still brings high returns. Deficiencies cause severe losses.

To make clear the effect of price inflation on profit at various volumes, the normal chart is repeated (Chart 2) and enlarged to cover $1.5-million volume at uninflated prices. Chart 3 shows the same $1.5-million volume, but under inflationary conditions. Costs and prices are up 20%.—Am Business, Apr, p16



BUNKER C OIL PREHEATED

Electric cartridge heaters, installed in fuel-oil tank and burner reservoirs, allow Polk Sanitary Milk Co., Indianapolis, to heat its plant with heavy, cheap bunker C oil. Preheating the oil causes it to flow freely and replace lighter, more expensive oil. Heaters are 10-kw. circulation units controlled by pumping rate and outside temperature. Thermostats prevent overheating of oil.—Elec C&M, May, p94



MACHINE DYES OR SCOURS RAW STOCK CONTINUOUSLY

Continuous dyeing or other processing of fibers, stock, or staple is accomplished with a machine developed by General Dyestuff Corp. Considerable economy over batch operations is realized by passing a large quantity of goods through a small dye bath. Machine has an endless chain-link belt. Goods enter in lap or stock form laid evenly on the chain mesh. A second belt sandwiches the material between the belts. Liquor penetrates freely, with no tension on the goods at any time. Preliminary to a full-scale run, as little as ½ lb. of stock may be put through and the results evaluated in less than 5 min.—Textile World, May, p147

Chemical Industry Abroad

▶ **South Africa**—New regulations now forbid export, except under license, of a wide range of commodities. Included are manganese, sulfur, and industrial chemicals. Exports to the U. S. and U. K. will be exempt, except for a few items.

▶ **France**—French are studying possibilities of making synthetic rubber—30,000-40,000 tons of GR-S and 10,000-12,000 tons of butyl per year by 1954. Investment necessary would be $14.5-million if rubber is made from alcohol, $52-million if made from petroleum.

▶ **Pakistan**—New pharmaceutical factory, the Ibna Sine Laboratory, was expected to go into production in June. Capacity—enough to fill domestic needs, plus some for export.

▶ **Egypt**—American experts have been preparing plans for a chemical fertilizer plant at Aswan. The plant will be one of the first to benefit from hydroelectric power from Aswan dam.—Chem Ind Wk, Apr 28, p14; May 5, p16

Triple Fiberduct Serves UN

Light, telephone, business-machine and buzzer outlets in United Nation's 39-floor Secretariat Bldg. in New York City are served by 43 miles of General Electric Fiberduct. This underfloor distribution system has a triple-duct grid design with inserts every 2 ft. to handle necessary outlets.

The system will permit adding more outlets at any time and changing the office layout. It also eliminates extension cords, keeps wall free of outlets, provides maximum space conservation, and avoids necessity of constant re-routing of conduits.—Elec C&M, May, p84

Catalyst Helps Burn Waste in New Du Pont Process

New plant to be built by Du Pont will feature a catalytic oxidation process to simplify disposal of organic waste materials. Process at present treats only vaporized waste with air.

The plant will dispose of two aqueous waste streams. One contains 3½% organics, principally formaldehyde, and the other 8% organics, mostly ethylene glycol derivatives.

In the process, wastes are drawn from distillation columns as vapors and oxidized with air over a chromatic catalyst at 250-275° C. Organics are almost completely converted to carbon dioxide and water.

A copper chromite catalyst, formed by pilling with graphite and burning, exhibits much greater activity than a fused catalyst. Complete conversion has been maintained for 1,000 hr. in pilot-plant tests, but care must be taken to prevent sintering of the catalvst.

The new process requires a higher investment cost than does an incinerator. But under favorable conditions (2½% organic material in the waste), operating cost is only 15-20% of that of an incinerator.—Chem Ind Wk, Apr 28, p30

West Germany on Wheels

Nine nations were represented at the International Auto Show held in Frankfurt, Germany, but 470 of the 518 exhibitors were from West Germany.

The show featured modern cars, light trucks, as well as many of the more-advanced technological improvements in the automotive field. Some of the models are already in production, others scheduled for late fall.

Faka Automobile Co. showed its new three-wheel, three-seat motor scooter, designed to provide cheap transportation for small families.

A new kind of splinterproof glass for windshields was demonstrated by Sicherheits-Berbundglas Industie. The glass is a three-ply affair with the middle layer consisting of elastic, transparent material.—Business Wk, May 5, p102

Precast Manhole Roofs

Use of precast manhole roof slabs has reduced traffic interference, speeded construction work, and improved public relations for the Potomac Electric Power Co. Up to 6 days are saved in concrete curing time, permitting the permanent street surface to be replaced that much sooner.

Roof slabs are made in eight sizes. Pouring them in the shop gives a denser, stronger concrete and is cheaper. Their use eliminates the necessity of shoring manholes and makes roof replacement a 1-day job.—Elec World, Apr 23, p121

REMOVES FINS FROM CORES

Major saving in making cores at Buick Motor Div., General Motors Corp., has been made by low-cost, home-made definning machines. This treadle-operated machine removes fin by frame-like die that lowers over core. Die is flat mat of rubber molded to fit core at plane where fins occur. Rubber wipes fins off. Larger machines are air-operated.—Iron Age, Apr 19, p95

Convention Calendar

(Equipment Exhibited)

Sept 1-10—First European Machine Tool Exhibition, Paris, France

Sept 10-14—Sixth National Instrument Conference and Exhibit, Houston, Texas

Sept 10-23—International Trade Fair, Chicago, Ill.

Oct 1-4—Sixth Annual Industrial Packaging and Materials Handling Exposition, Cleveland, Ohio

Oct 8-12—National Hardware Show, New York, N. Y.

Oct 15-19—National Metal Congress and Exhibition, Detroit, Mich.

Oct 22-26—National Business Show, New York, N. Y.

Nov 5-8—Refrigeration Equipment Manufacturers Association Exposition, Chicago, Ill.

Nov 26-Dec 1—National Chemical Exposition, New York, N. Y.

To anyone interested in any of these exhibitions, either as a possible exhibitor or visitor, the McGraw-Hill Digest will be glad to furnish additional information.

Grade Crossing Is Smooth

Most grade crossings inside industrial properties are rough, particularly for lift trucks. Mathieson Chemical Corp. smoothed its crossings with Koppers Co., Inc., pressure-creosoted timber panels. The panels are prefabricated, resist decay, and will not deteriorate by sagging, washboarding, or disintegration. Panels can be easily removed and replaced without damage.—Factory, May, p140

New Method of Prestressing Puts Concrete in Tension

Big savings in concrete and steel may be achieved by prestressing concrete columns and arches. Dead load carried by these compression members can be neutralized by applying tensile forces in advance of, or simultaneous with, the assumption of dead load by these members.

This is a suggestion of Kurt Billig, Hong Kong University. The usual prestressing method compresses concrete beams in advance of the application of loads.

The prestressing member is a steel strut. It is put in compression by attaching to its ends a steel cable that is under high tension. The strut is embedded in the column and, after the concrete has attained sufficient strength, the cable is detached. Expansion of the strut puts tension in the column.

Dead weight is carried by the steel; concrete need be designed only for live load. Reduction in cross section of an axially loaded column may be 50% or more; the saving in weight of steel may be 80% or more.—Eng News-Rec, May, p33

New High-Speed Tach

A precision tachometer has been developed by the Plessey Co., England. The instrument was designed for flight testing new engines and can measure shaft speeds up to 20,000 rpm. with an accuracy of 10 rpm. Such precision is important for jet-engine operation where overspeeding can be dangerous and close supervision of speed is important for fuel economy considerations.

A slotted disc-photoelectric cell combination picks up shaft speed, the indicator being remote from the main equipment.— Aviation Wk, Apr 30, p45

▶ **Money spent for good materials handling will save enough in a few years to pay for itself. Then savings in excess labor costs are profits.**

▶ **A good handling system will help meet production schedules, eliminate bottlenecks, and allow increased production in same space.**

▶ **These three words—elminate, minimize, mechanize—are the keys to planning a better materials-handling system and show how . . .**

Better Materials Handling Cuts Labor, Speeds Production

Report to Management

BETTER MATERIALS HANDLING is the fastest way to save manpower and speed production. Other benefits result from an improved handling system:

- Steady flow of parts and materials
- Shorter manufacturing cycles
- Better use of space
- Better working conditions

Here is what to do to improve a materials-handling job: First, a survey of present practice is made. This is illustrated with a flow chart. Each part, or group of parts, from start to finish is traced on the chart. Then each move, storage, inspection, operation, and regular delay are noted. The chart becomes a picture of the physical movement problem.

These questions should be answered: How often and how much is transportation equipment delayed when delivering parts and materials? That takes labor and equipment drive. It is one reason for trying to use self-loading and unloading equipment.

What size is the material unit delivered? Could it be bigger? It takes more man-hours to handle 100 units weighing 10 lb. each than it takes to handle one unit that weighs 1,000 lb., assuming the right equipment is used. Also, handling 100 units can slow production and take up more space.

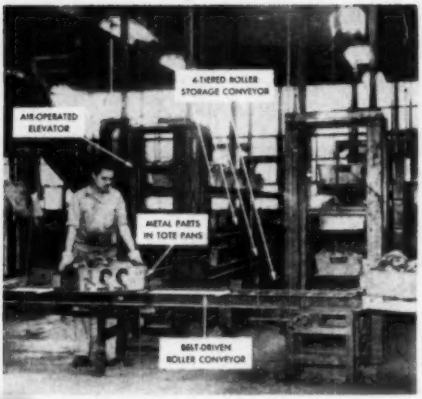
How much labor does it take to handle material per unit of time at normal operation? Is there much manual handling? Is space jammed with materials? How far is material moved?

Is there a possibility that the material could move itself? By gravity? Sometimes it pays to raise the material up to the point where it can move by gravity to the next operation. Ohio Rubber Co. (p54) successfully applies this technique.

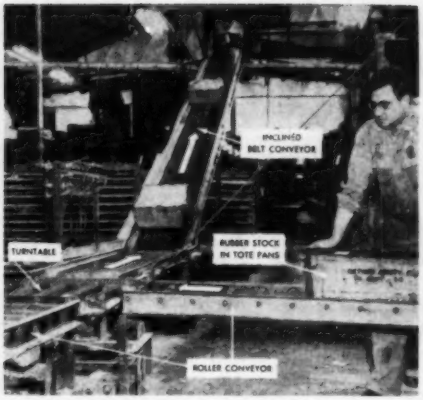
When planning a materials-handling system for an existing plant, good practice is to determine the ideal plant for existing operations. Then the ideal plant must be made to fit as close as possible to the present plant.

Three rules govern the planning of a materials-handling system: (1) eliminate all possible handling, (2) minimize moves that are left, (3) mechanize wherever possible.—Factory, May, p81

FRONT COVER—Two important tools for materials handling are (upper left) an electric hoist and (lower right) a belt conveyor



***METAL PARTS** are transferred by air-operated elevator from four-tier storage conveyors (background) to roller conveyor that moves them to production department for processing.*



***RUBBER STOCK** is added. Turntable aids transfer from rollers to belt. Inclined belt takes tote pans of metal parts and rubber stock to gravity "declines" that feed curing presses.*

Integrated System Doubles Production

Problem: To increase capacity and control flow of metal parts, rubber stock, and finished items.
Solution: Moving parts and materials to the right place at the right time—in tote pans, on roller and belt conveyors.
Benefits: Cut handling labor costs by more than 50%. Boosted production rate. Improved working conditions. Reduced process inventories. Condensed space per unit of production. Cut material waste.

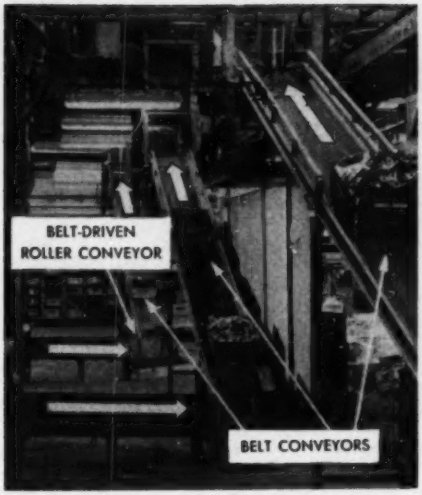
A GRADUAL CHANGE of products caused overloading of manufacturing capacity at the Ohio Rubber Co. Space was at a premium. Labor costs for handling were high.

Other problems faced the Ohio Rubber Co.: Manufacturing capacity had to be doubled with no extra space available. That meant overhauling the whole plant. So materials handling practices had to be carefully studied, and a workable plan that would fit the limitations on space adopted.

After carefully considering alternate methods of handling, the Ohio Rubber Co. decided to use conveyors and tote pans. The company had experience with tote pans and found them satisfactory. All it had to do was handle them better.

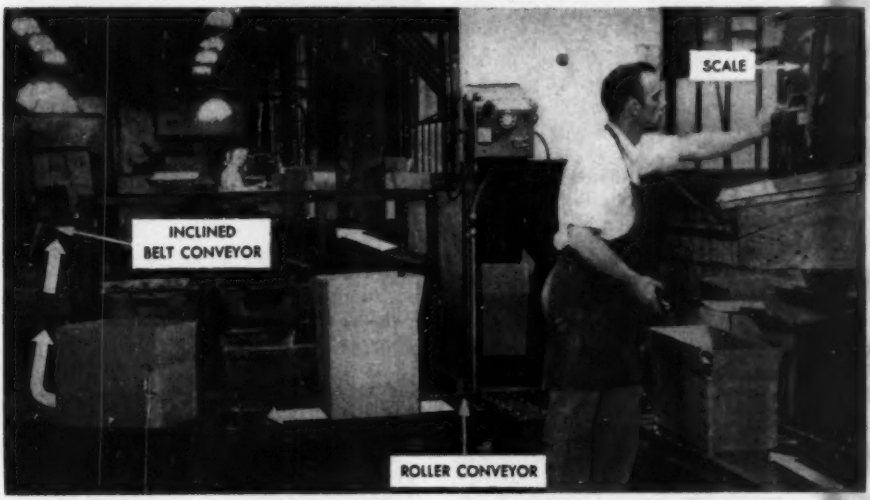
Roller conveyors were selected to do the basic handling. Analysis proved them best for conditions at Ohio Rubber. To that equipment, devices to keep enough material moving to the right place at the right time were added. They included power-driven sections, switches, elevators, inclined belts, four-tier temporary storage sections, and gate sections to permit safe walking.

All this equipment was put together to form an integrated handling system. It carries all materials from raw stores to the warehouse with least effort consistent with economy.

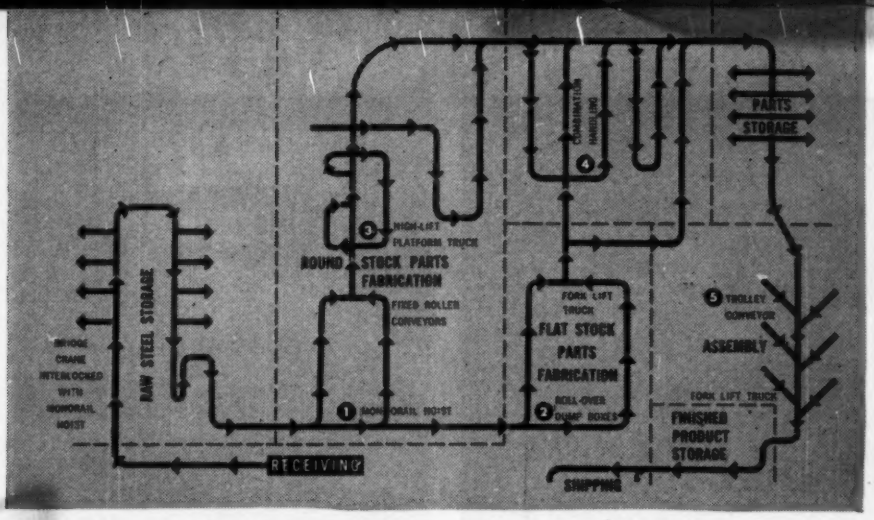


***CURED PRODUCTS** are transferred from line roller conveyors to belt conveyors that take them "upstairs" to the main collecting unit.*

***PRODUCTS** move down decline to central check point. Operator checks tote pans, then spots them in four-tier roller conveyors.*



***FINISHED GOODS**, packed in cartons and ready for shipment, are check-weighed. Then cartons move by roller conveyor to inclined belt and are raised to gravity rollers that carry cartons to finished goods warehouse and storage. From parts to finished product, all movement is by means of belt conveyors, roller conveyors, or gravity chutes.*



***INTEGRATED** materials-handling equipment gives Jeffrey Mfg. Co. a method for . . .*

Making the Equipment Fit the Job

Problem: Obsolete handling methods jammed inadequate space, handicapped production efforts.
Solution: Better handling system utilizing right equipment for each job.
Benefits: Reduced handling costs. Increased output of all production machines. Freed floor space for production. Lowered scrap losses. Reduced in-process inventories. Bettered working conditions.

JOB-LOT OPERATION with as many as 250 orders at a time in chain shop of Jeffrey Mfg. Co. caused material confusion and consequent delays. Jeffrey Mfg. set up this system:

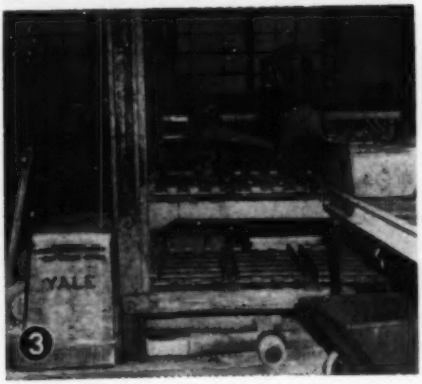
1 Electric hoist on monorail track, controlled from floor, moves steel bar stock from temporary storage racks to machines as it is needed. A bridge crane carries bundles of steel from raw steel storage (see diagram) to temporary storage areas by way of interlocking tracks.

2 Roll-over dump boxes carry flat stock parts through fabrication, from time that parts are cut from long bars to assembly. Boxes have skids and lugs for truck or hoist handling.

3 High-lift platform truck moves tote boxes of round stock parts through secondary operations. Conveyor sections on truck platforms make it easy to transfer tote boxes.

4 Combination handling is used in heat-treating department to provide service for all processes. Bridge crane, monorail conveyor, roller conveyor, platform and fork lift trucks carry parts containers through a variety of processes.

5 Trolley conveyor picks up assembled chains in the assembly area, carries them automatically through oil dipping to conveyor unloading point. Continuous flow of product over this route makes a conveyor a natural selection.


YALE

New Move-and-Load Method Saves Time

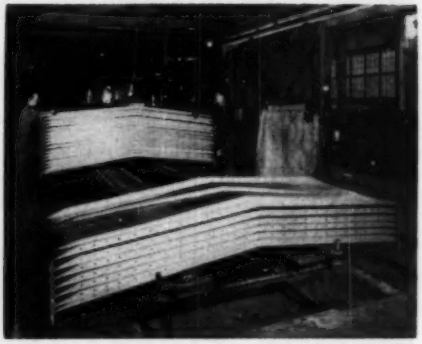
Problem: To get heavy steel stampings from the press to and into railroad cars.
Solution: An integrated system of positioners, conveyors, hoists, cranes, and a car puller.
Benefits: Five men, with less physical labor, now do the work nine men used to do—44% saving. And gondola cars instead of boxcars can be employed. Boxcars are sometimes in short supply.

Old Way: Panels were hauled by Standard Railway Equipment Mfg. Co. from the press to the car by hand truck. Manual labor then lifted the panels into the car. Boxcars were employed because they were easier to load than other cars.
New Way: Now, following the last press operation—forming the flanges—two operators nest the panels on a skid. The skid rides a roller conveyor section mounted on a hydraulic lift. The lift drops with each panel, so the operators are able to slide the panels onto the stack.

When panels have been stacked, the operator raises the lift to align with two sections of parallel gravity roller conveyor that form a twin runway. Two men guide the stack downhill. With stack on a tilting section, same two men place spacer blocks and steel-strap the stack.

First a hoist pulls the tilting device up until the stack rests edgewise to be loaded. Then a 3-ton electric crane, controlled from the ground, carries the stack to the gondola car. A specially designed rig makes hooking and unhooking fast and easy. A car puller spots the cars under the crane.

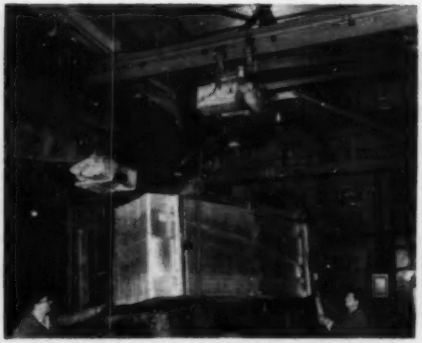
***STEEL CAR PANELS** are nested on skid, resting on hydraulic lift. Lift keeps stack at easy work level.*



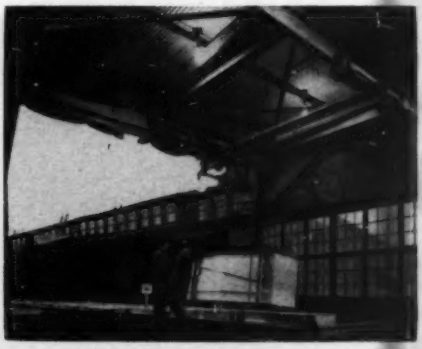
***STACKS OF PANELS** are raised to roller conveyor level by lift, and two men roll them to shipping area.*

***BUNDLE OF PANELS** is steel-strapped at end of conveyor. Separator blocks protect shape.*

UPENDER TURNS BUNDLE of panels on edge, shifting load from short end conveyor sections to backstop. Fixed hoist, controlled by man at left, does the work. Panels are set on edge so each one supports only its own weight. Strapping helps prevent distortion of panels.

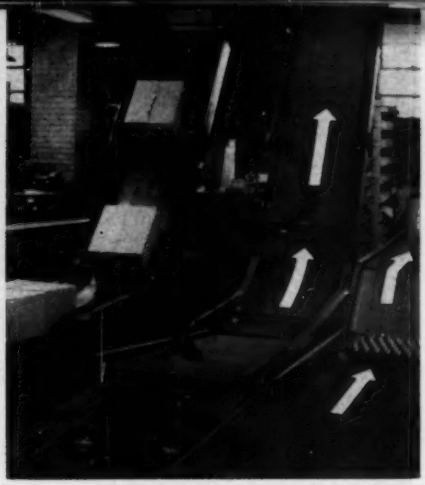


ELECTRIC CRANE, fitted with special carrying rig, takes bundle from upender to railroad car.



PANELS ARE LOWERED into car by electric crane. Remote control takes crane and rig back.

MAIN PACKING LINE packs sets of ware into shipping cartons as they ride belt.



END OF PACKING LINE has switcher for sending carton to shipping or storage.

Faster Shipping—at 20% Less Cost

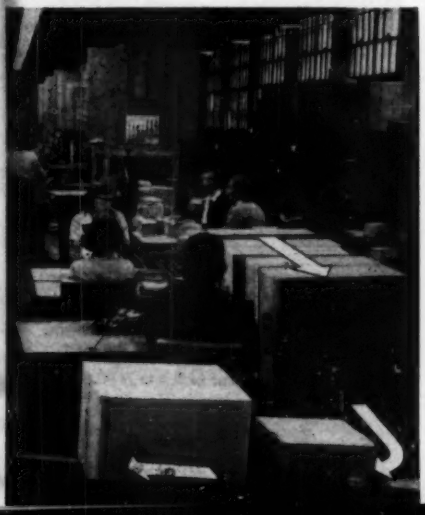
Problem: To package and ship 100% more specialty products—and overcome handicap of jammed space, and shipping delays.

Solution: Set the operation apart. Minimize handling with more efficient layout and equipment.

Benefits: Cut warehousing and shipping costs 20%. Speeded deliveries. Reduced mistakes. Curtailed claims for damaged products.

Old Way: Here is former Aluminum Cooking Utensil Co. practice.

MISCELLANEOUS PACKING LINE assembles odd lots into cartons.



BELT AND ROLLER conveyors carry labeled cartons past postage meter.

***POST OFFICE** on first floor receives cartons by chutes that ease cartons onto gravity roller conveyors. Postal clerks postmark cartons right on the conveyor.*

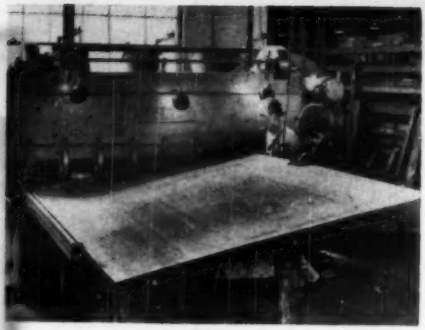
The ware came from production lines in crates or on pallets. Workers, stationed along a roller conveyor, packed the ware into shipping cartons as the cartons moved along the conveyor. Toward the end of the line, cartons were sealed, labels were attached, cartons were weighed, and postage was determined and applied.

Cartons, in pallet loads, were then moved to a ground-level storage area. Trucks took the pallet loads to a post office.

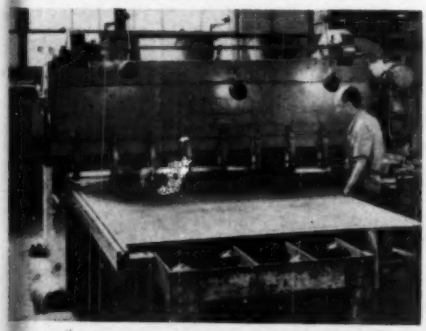
New Way: Two packing lines operate. The first packs regular sets from crates into cartons. The second packing line handles small miscellaneous orders on a packing table. Other changes and improvements are shown in the pictures.

***BELT CONVEYLOR** collects cartons from the post office and carries them overhead along five-car railroad siding. Guides push cartons off belts into right car.*

ONE MAN with floor-controlled crane moves raw plate from storage area to shear where plate is cut to size.



SAME MAN positions raw plate on shear by wedging edge against stop (left) and lowering plate. Crane does work.



SAYS HE: Ball transfer joints make lateral movement easy. It is a one-man operation where once two men were required.

One Man Does Work of Two

Problem: Baker-Raulang Co. formerly bought sheet and plate components. Costs were high. Deliveries erratic and undependable. The company decided to do its own shearing.
Solution: A heavy-duty shear, a special positioning table, and an electrified crane.
Benefits: Greater flexibility—now the company can handle its square shearing without depending on outside sources, can work new designs without subcontracting parts to fabricator. Surer supply of parts—no longer does Baker-Raulang Co. have to depend on the steel fabricator. It buys raw plates direct from mill.

IN ADDITION, the greater flexibility has increased efficiency by one-third. As a result of the improvements outlined above, more direct labor can be employed without increasing the overhead by any appreciable amount, thereby lowering the burden ratio. Lower burden and lower material costs mean lower production costs, and lower production costs justify the expense in making the change.

EX-CELL-O

PRECISION BORING MACHINES

Typical of the machine tools that have made the Ex-Cell-O name famous are its machines for such metal working operations as precision boring, turning and facing. The Ex-Cell-O Style 1212-A Machine shown here accommodates small and medium size parts and may be tooled for work in small lots or large volume. One or more precision spindles or boring heads can be arranged on each machine bridge. The controls of the hydraulically operated machine table are easily adjusted to obtain an automatic cycle which may include rapid movement, two infinitely adjustable feed rates, immediate or dwell reverse and stop in both directions of travel.

This and many other Ex-Cell-O products are fully described in Catalog 27281. Use the coupon below to get your copy.

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN, U.S.A. • CABLE ADDRESS: XLO DETROIT, U.S.A.

PRECISION MACHINE TOOLS • CUTTING TOOLS • MACHINES TO PACKAGE ROLLS IN SANITARY PAPER CONTAINERS

Machine tools, grinding spindles, hydraulic power units, tool grinders—all these and many more Ex-Cell-O products are concisely yet completely described in Catalog No. 27281. Write for your copy. There is no charge.

EX-CELL-O CORPORATION
Detroit 32, Michigan, U.S.A.

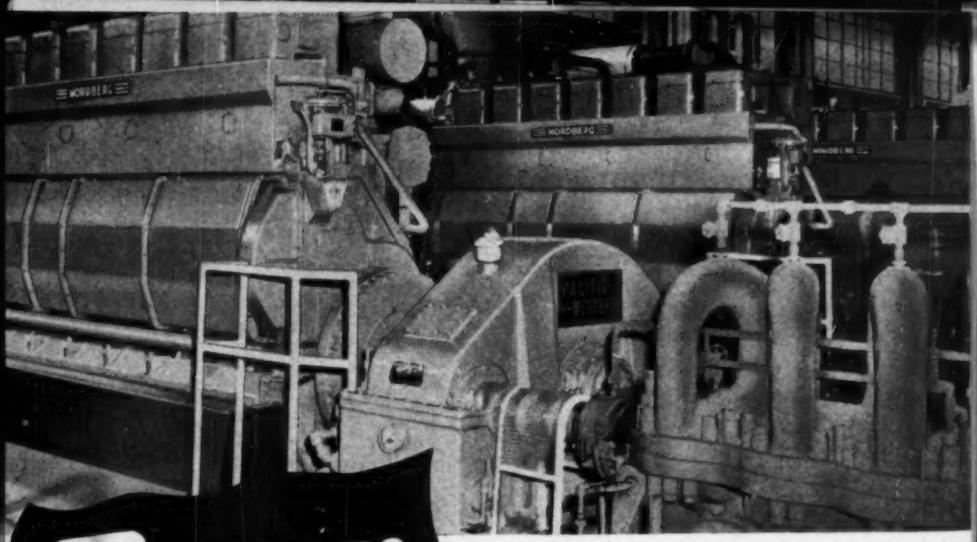
Please send without obligation copy of Ex-Cell-O General Catalog No. 27281.

Name_____

Company_____

Address_____

City and Country_____



6 NORDBERG *Duafuel** ENGINES

supply 6300 horsepower for new RICHFIELD PIPE LINE

Here are three of six Nordberg Duafuel* Engines installed in the Tejon and Wheeler Ridge pump stations of the new Richfield Oil Corporation 14-in. pipe line, which connects the company's production in the San Joaquin and Cuyama Valley fields with the Los Angeles area. These dependable 7-cylinder Supercharged Nordberg Duafuel* engines each develop 1050 hp at 450 rpm, and are designed to operate on natural gas plus Cuyama Crude as pilot oil, on straight Cuyama Crude, or with any proportion of either fuel. Instantaneous conversion from one fuel to another allows the most economical fuel to be used at all times.

For main line or booster stations—you can count on Nordberg engines, in sizes up to 9600 hp. (**Trade Mark*)

Write for further details, outlining your power requirements.

XO151

NORDBERG MFG. CO., Milwaukee 7, Wis., U.S.A., CABLE ADDRESS: NORDBERG

NORDBERG THE WORLD OVER

LONDON
Brook House, Park Lane

JOHANNESBURG
P.O. Box 4139

MEXICO, D.F.
Dolores 3

PRODUCTION IDEAS

from Manufacturers' Catalogs

7-1 Processing Equipment — Blaw-Knox Co. 28p. Bulletin 342 describes equipment for processing chemicals, pharmaceuticals, and food products. It also includes pilot-plant and laboratory equipment.

7-2 Lighting Data—Westinghouse Electric International Co. 32p. Two booklets B-4727 and B-5254 give detailed information on lighting of industrial and commercial buildings. Many different types of lights are illustrated.

7-3 Industrial Machinery—Nordberg Mfg. Co. 28p. Stationary and marine diesel engines, cone crushers and screens, mine hoists, basic ore processing machines and railway track maintenance machines are described in catalog 187.

7-4 Track and Road Vehicle—Whiting Corp. 12p. Bulletin TM-101 describes a vehicle that operates on either railroad tracks or road. (McG-H Digest, Feb, p49). On tracks vehicle can spot, switch, or haul cars.

7-5 Mobile Two-way Radio—RCA International Corp. Detailed description of two-way radio communication (152-174 mc.) systems for vehicles is contained in "Carfone Station Equipment".

7-6 Aids Vacuum Computations—F. J. Stokes Machine Co. Stokes Vacuum Calculator is designed for fast calculations in vacuum research and processing work.

7-7 Speed Control Device—Allis-Chalmers Co. 12p. Bulletin 20B7223A describes an automatic drive for instant speed control covering speed changing needs from 1½ to 40 hp.

7-8 Decorating Styrene Plastic—Monsanto Chemical Co. 28p. Illustrated booklet describes decorative treatments for styrene plastic. Treatments include metalizing, lacquering, stamping, and printing.

7-9 Motor-generator Sets — International General Electric Co. 8p. Motor-generator sets from 30-8,000 kw. are covered in booklet GEA-5506 as source of d-c. power for rolling mill drives, electrolytic refining, excitation, mining, many other industrial applications.

7-10 Diesel Engine Maintenance — Cummins Engine Co. 4p. Service bulletin gives five reasons why operating expenses are less with protective maintenance.

7-11 Fork Lift Trucks—Towmotor Corp. 24p. Five folders (JS105, SP-7, AD-12, SP-6, F2) describe applications of fork lift trucks to canned food warehousing, special handling work, and cotton bale handling.

7-12 Drive Accessories—Link-Belt Co. 8p. Folder 2363 covers RC roller-chain flexible shaft couplings, and Folder 2344 gives complete specifications on S-815 flat-top conveyor chain.

7-13 High-temperature Lubricants — Climax Molybdenum Co. 56p. Booklet "Molybdenum Disulfide as a Lubricant" contains excerpts from technical papers on molybdenum-base high-temperature lubricants.

7-14 Precision Cylindrical Grinders—Landis Tool Co. 16p. Machine for precision grinding of ball bearing races and similar operations is described in catalog R-51.

7-15 Cleaning Ferrous Metals—Pennsylvania Salt Co. 16p. Booklet S-560 details methods for alkaline soak tank cleaning, alkaline spray cleaning and alkaline electrolytic cleaning.

7-16 Industrial Gaskets—United Steel Gasket Co. 48p. Metal, metal-asbestos and cut gaskets from many materials including Teflon are described.

7-17 Dry Grinding, Wet Grinding—Hardinge Co., Inc. 52p. Two catalogs (17-B, AH-389) describe conical mills for grinding or pulverizing different materials.

7-18 Water Treatment Equipment—Hungerford & Terry, Inc. 32p. Four bulletins (FF-1, DM, AF-1, B-1) describe units for filtering and demineralizing water.

7-19 Maintenance Machine—Huber Mfg. Co. 8p. Versatile machine can grade roads, plow snow, roll fill, load materials, trim roadside vegetation, fill trenches, and sweep roads. Catalog M-138-F, written in French, describes the machine.

7-20 Success Stories—National Automatic Tool Co., Inc. 48p. Six folders make up a

PRODUCTION IDEAS (Cont.)

"Case History File" describing machine tools that have saved labor and time in making products ranging from road graders to cameras.

7-21 Conveyor Chains—Chain Belt Co. 12p. Booklet 50-35 stresses careful selection of several different types of chain conveyors for handling products from raw material to finished unit.

7-22 Hoisting Equipment—American Hoist and Derrick Co. 24p. Catalog 300-24 describes complete line of block and sheaves. Data on reeving and line part figuring is included.

7-23 Drainage Structure Installation — Armco Drainage & Metal Products, Inc. 46p. Installation Manual can assist construction men in proper methods of installing culverts, sewers, or conduits.

7-24 Abrasive Blast Cleaning—American Wheelabrator & Equipment Corp. 40p. Two booklets: Booklet 11 describes airblast equipment, accessories, and supplies, Booklet 40E describes airless method of abrasive blast cleaning with centrifugal force.

7-25 Rubber and Plastics Calenders—Farrel-Birmingham Co. Inc. 32p. Included in catalog 174 are general specifications, design improvements, roll arrangements and drawings of calenders for processing rubber and plastics.

7-26 Pressure Vessel Components—Taylor Forge & Pipe Works, Inc. 116p. Nozzles, welding necks, large diameter flanges, and flange design data for pressure vessels is contained in catalog 501.

7-27 Pipeline Construction Machines — Thew Shovel Co. 12p. Booklet "Lorains on Pipeline Construction" features application of power shovels, cranes and a specially designed hoe to pipeline construction.

7-28 Jig Borer—Pratt & Whitney Div., Niles-Bement-Pond Co. 12p. Circular 530 describes model 4E jig borer featuring electronic control of milling speeds.

7-29 Resins for Adhesives—Hercules Powder Co. 20p. Booklet 979-3500 reports on the resins' contribution to film cohesion, surface tack, bond strength, and other properties of adhesives.

7-30 Speed Reducers—Dodge Mfg. Corp. 28p. Two bulletins, A-470A and A602B, help simplify selection of shaft-mounted speed reducers.

7-31 Convertible Crawler—Bay City Shovels, Inc. 20p. Three-quarter yard crawler, convertible to a shovel, crane, dragline, clamshell and hoe is described in bulletin 37-45A.

7-32 Motor Protectors—Spencer Thermostat Co. 6p. Two folders (PR112, PR136) describe a device for protection against overheating of electric motors, solenoids, and small transformers.

7-33 Wired Television — Diamond Power Specialty Corp. 16p. Bulletin 1025 describes the Utiliscope, a wired television system (camera and receiver) to view jobs too dangerous, inconvenient, or inaccessible for direct viewing.

These manufacturers' catalogs will be sent free to subscribers. Fill in squares with catalog numbers desired and mail to the Editor, McGraw-Hill Digest, 330 W. 42nd St., New York 18, N. Y., U. S. A.

Good until Oct. 1, 1951. (Part below MUST be completely filled in. Please TYPE or PRINT.)

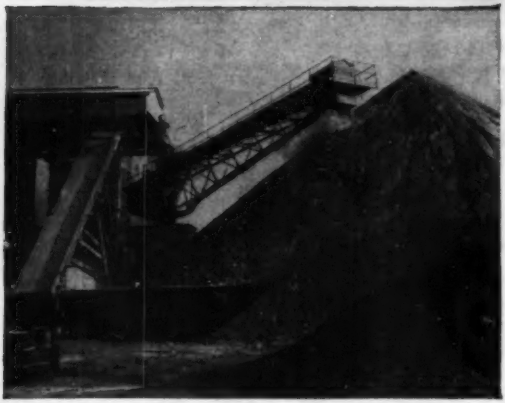
Name .....

Title .....

Company .....

Address .....

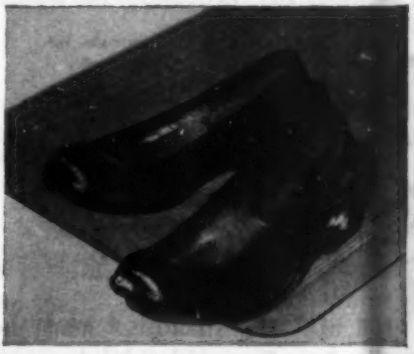
.....



600 TONS PER HOUR of sulfur or bauxite can be handled by this new ship unloader installed at Cyanamid's Warners Plant in Linden, New Jersey. Consisting of an unloading tower and a new type of boom stacker with auxiliary conveying and distributing equipment, this installation has reduced previous handling time by 50%. The use of the newest methods and equipment is part of Cyanamid's continuous effort to increase operating efficiency and lower production costs.

Cyanamid

enterprise brings you profit and progress



MAKING RUBBER PRODUCTS BETTER is the main function of Cyanamid's PEPTON® 22 Plasticizer. This compound, which can be added directly to the latex at the plantation, offers many important advantages. It cuts breakdown time by 50%, helps reduce power consumption, and improves the processing qualities of the raw rubber. Send today for complete information—or consult your Cyanamid representative.

SUNLIGHT AND THE HOUSEWIFE'S WASH can be very destructive to colored fabrics. Vat dyes, one of the numerous types of dyes made by Cyanamid's Calco Chemical Division, applied to a variety of textiles—men's hosiery, denim yarns, wool for use in automotive fabrics, knitted fabrics, fabrics made from blended fibers—have successfully demonstrated their superlative qualities under these severe conditions. They have enabled textile manufacturers to produce cotton, wool and viscose materials of remarkable color fastness. Perhaps Calco's vat dyes can also improve the quality of your fabrics.

INFORMATION ON THESE AND OTHER CYANAMID PRODUCTS for the drug, textile, leather, rubber, paper, ink, paint, plastics, mining and other industries is available on request. Write for more information or see one of our representatives.

AMERICAN Cyanamid COMPANY

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

REPRESENTATIVES THROUGHOUT THE WORLD

CASTINGS

PARTS WHICH RESIST IMPACT, ABRASION, HEAT AND CORROSION

Where product and machinery parts must resist severe impact, heat, corrosion or abrasion, you will find castings by Brake Shoe giving longer life at lower cost.

BRAKE SHOE CASTINGS FIND USE IN THESE AND OTHER INDUSTRIES THROUGHOUT THE WORLD:

Manganese Steel	Thermalloy and Chemalloy
Construction	Automotive
Coke and steel	Cement and lime
Clay products	Petroleum
Coal mining	Steel
Dredging and excavating	Power plants
Metal mining	Metals smelting and refining
Oil	Chemicals
Railroad	Farm Equipment

Amsco manganese steel power shovel dipper work-hardens in use.

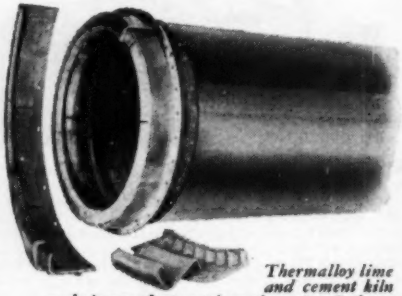
FOR IMPACT AND ABRASION— Use Amsco manganese steel

"The toughest steel known"—Containing 12-14% manganese, this alloy resists heavy impact encountered by power shovel dippers, jaw crushers, dredge pumps, railroad crossings and the like. The more you use it, the harder it gets. The surface takes on a hard "plowshare" polish that resists abrasion while the body metal retains its original impact resisting toughness.

FOR HEAT AND CORROSION RESISTANCE— Use Brake Shoe's high nickel chrome alloy

For over 25 years, Brake Shoe has been producing metals that retain high strength and resist oxidation and corrosion at temperatures up to 2100°F.

Brake Shoe's heat-resistant alloys are called *Thermalloy;* Brake Shoe's corrosion-resistant alloys are called *Chemalloy.* Castings of Thermalloy and Chemalloy save money throughout industry, because of their lower maintenance costs and exceptionally longer life.



Thermalloy lime and cement kiln end rings outlast cast iron rings up to 7 times.

AMERICAN Brake Shoe COMPANY

EXPORT DIVISION

230 PARK AVENUE NEW YORK 17 N.Y. U.S.A. · CABLE BRAKESHOE NEWYORK

Convert to CUMMINS® DIESELS

Save money! Convert your present gasoline-powered equipment to economical **Diesel power by Cummins!**

Make money! Earn bigger profits through greater fuel savings . . . smaller repair and less major overhaul expense . . . by specifying Cummins Diesels **in your new equipment.**

Engineering assistance **FREE;** *also printed operating instructions in French, Spanish, or Portuguese.*

CUMMINS DIESEL EXPORT CORPORATION

Columbus, Indiana, U. S. A.—Cable: CUMDIEX

New York City Office: 6303 Chrysler Building • Tel. Murray Hill 9-4334

Lightweight High-speed Diesel Engines (50-550 hp) for: On-highway trucks • off-highway trucks • buses • tractors • earthmovers • shovels cranes • industrial locomotives • air compressors • logging yarders and loaders • drilling rigs • centrifugal pumps • generator sets and power units • work boats and pleasure craft.

CUMMINS Dependable DIESEL

Diesel power CUMMINS

Trademark Reg. U. S. Pat. Off.

ADVERTISERS IN THIS ISSUE

ALLIS-CHALMERS MANUFACTURING CO.... 1
Compton Advertising, Inc.

AMERICAN BRAKE SHOE CO. 68
Fuller & Smith & Ross, Inc.

AMERICAN CYANAMID CO. 67
Hazard Advertising Co.

BANK OF AMERICA 8
Chas. R. Stuart, Adv.

BETHLEHEM STEEL EXPORT CORP. .. 4th Cover
Gotham Advertising Co., Inc.

BLISS CO., E. W. 4, 5
Fred Wittner Advertising

CLARK EQUIPMENT CO. 6
Marsteller, Gebhardt & Reed, Inc.

CUMMINS DIESEL EXPORT CORP. 69
Needham, Louis & Brorby, Inc.

DoALL CO. 12
Russell T. Gray, Inc.

DOW CHEMICAL COMPANY 36, 37
MacManus, John & Adams, Inc.

EX-CELL-O CORPORATION 63
Holden, Clifford, Flint Inc.

FOOD MACHINERY & CHEMICAL CORP. ... 15
McCarty Co.

GENERAL ANALINE & FILM CORP. ANTARA DIV. 2
The Blow Co.

GENERAL MOTORS OVERSEAS OPERATIONS 16

INTERNATIONAL HARVESTER EXPORT CO. .....2nd Cover
McCann-Erickson Corp.

McGRAW-HILL BOOK CO. 71

MONSANTO CHEMICAL CO. 11
Gardner Advertising Co.

NORDBERG MANUFACTURING CO. 64
Russell T. Gray, Inc.

NORTON CO. 72
James Thomas Chirurg Co.

STANDARD OIL COMPANY (NEW JERSEY). 7
McCann-Erickson Corp.

WESTINGHOUSE ELECTRIC INT'L CO. .....3rd Cover
National Export Adv. Service

Publications Digested:

McGraw-Hill Publishing Co. Inc., 330 W. 42nd St., New York 18, N. Y.
American Machinist • Aviation Week • Bus Transportation • Business Week • Chemical Engineering • Chemical Industries Week • Coal Age • Construction Methods & Equipment • Electrical Construction & Maintenance • Electrical Merchandising • Electrical West • Electrical Wholesaling • Electrical World • Electronics • Engineering & Mining Journal • E & M Mineral & Metal Markets • Engineering News-Record • Factory Management and Maintenance • Fleet Owner • Food Engineering • Industrial Distribution • Machinist (London Office) • Nucleonics • Pharmacy International • Power • Product Engineering • Textile World • The American Automobile (Overseas Edition) • The Welding Engineer

Chilton Company, Chestnut and 56th St., Philadelphia 39, Pa.
Automotive Industries • Boot & Shoe Recorder • Commercial Car Journal • Department Store Economist • Distribution Age • Hardware Age • Hardware World • Motor Age • The Iron Age • The Jewelers' Circular-Keystone • The Optical Journal & Review of Optometry • The Spectator

Dartnell Publications, Inc., 4660 Ravenswood Ave., Chicago 40, Ill.
American Business

Fritz Publications, Inc., 59 East Van Buren St., Chicago 3, Ill.
The Paper Industry

Industrial Publications, Inc., 5 South Wabash Ave., Chicago 3, Ill.
Ceramic Industry

Modern Packaging Corp., 122 E. 42nd St., New York 17, N. Y.
Modern Packaging

Modern Plastics, Inc., 575 Madison Ave., New York 22, New York
Modern Plastics

Petroleum Publishing Co., 211 S. Cheyenne Ave., Tulsa 1, Okla.
The Oil and Gas Journal

Simmons-Boardman Publishing Corp., 30 Church St.; New York 17, N. Y.
American Builder • Marine Engineering & Shipping Review • Railway Age • Railway Engineering & Maintenance • Railway Mechanical & Electrical Engineer • Railway Signaling & Communications

The Penton Publishing Co., Penton Building, Cleveland 13, Ohio
Foundry • Steel

McGraw-Hill World News Bureaus: London, Paris, Frankfurt, Tokyo, Bombay, Melbourne, Mexico City, Rio de Janeiro, Stockholm, and 60 other industrial cities.

5 Timely McGRAW-HILL BOOKS

MATERIALS HANDLING CASE BOOK

Edited by LEWIS K. URQUHART, Managing Editor, *Factory Management and Maintenance;* and CARROLL W. BOYCE, Industrial Production Editor, *Factory Management and Maintenance,* February, 1951. 384 pages, $8.00

Anyone whose job involves the storing or moving of materials in, through, or about a plant or warehouse will find this book a valuable source of timely materials handling ideas. Here are 190 specific approaches to materials handling problems that have been used successfully in industry by 145 different companies—actual practices that may quickly be adapted and combined to one's own particular needs. The book is unique in presenting a selection of articles of practical worth from the pages of *Factory Management and Maintenance.* For the reader's quicker and easier use these articles are arranged in chapters according to *where in the plant the problem exists.* The book proceeds logically from case studies covering materials handling in receiving and shipping, machine lines, production, and finishing operations to those covering materials handling on assembly lines, in packaging, storage, and out in the yard.

LIQUID EXTRACTION

By ROBERT E. TREYBAL, Professor Chemical Engineering, New York University. *McGraw-Hill Chemical Engineering Series,* April, 1951. 422 pages, $7.50

Liquid Extraction represents a complete review and organization of the subject matter of the unit operation of liquid-liquid extraction. All phases of the subject are covered: the physical chemistry of liquid-liquid equilibria, prediction of equilibria, thermodynamics of non-ideal solutions, choice of solvent, diffusion in liquids, theoretical discussion of mass transfer, design of extraction systems (flowsheets and equipment), description of equipment and operating characteristics, and a brief review of important modern chemical processes using liquid extraction.

This new book offers a complete coverage of the subject which has heretofore been unavailable. Unique in its field, this excellent volume is characterized by its completeness, organization, correlation of apparently unrelated data, and detailed references to original sources of information.

COLLECTIVE BARGAINING

By NEIL W. CHAMBERLAIN, Associate Professor of Economics and Assistant Director, Labor and Management Center, Yale University. February 1951. 534 pages, $6.00

This distinguished new text weaves together the economic, political, legal, and sociopsychological strands which have determined and are determining the nature of the collective bargaining relationship in the United States. It is a general survey rather than one of specific industries, discussing the basic issues underlying union-management relationships in all industrial contexts. This treatment is not fundamentally concerned with unionism, labor legislation, or the problems of employment as such; rather, these topics enter the discussion only in so far as they directly affect the character of the bargaining relationship and the problems attending it.

ELECTRONIC MOTOR AND WELDER CONTROLS

By GEORGE M. CHUTE, Application Engineer, General Electric Company, Detroit. May 1951, 350 pages. $6.50.

Among hundreds of kinds of electronic control used in industry, two groups are encountered more often in large plants—controls for motors and controls for resistance welders. This book provides specific and detailed treatment of this limited portion of the field of industrial electronics. In these two groups, those equipments are described that appear in quantity throughout the United States.

The purpose of the book is to assist those who must select, install or service these equipments, by explaining the circuit operation in great detail. Most of these circuits have been developed during the last three years, and have not been described previously. Since most motor controls are closed-loop systems that may involve unstable operation, means are described for stabilizing or antihunt purposes.

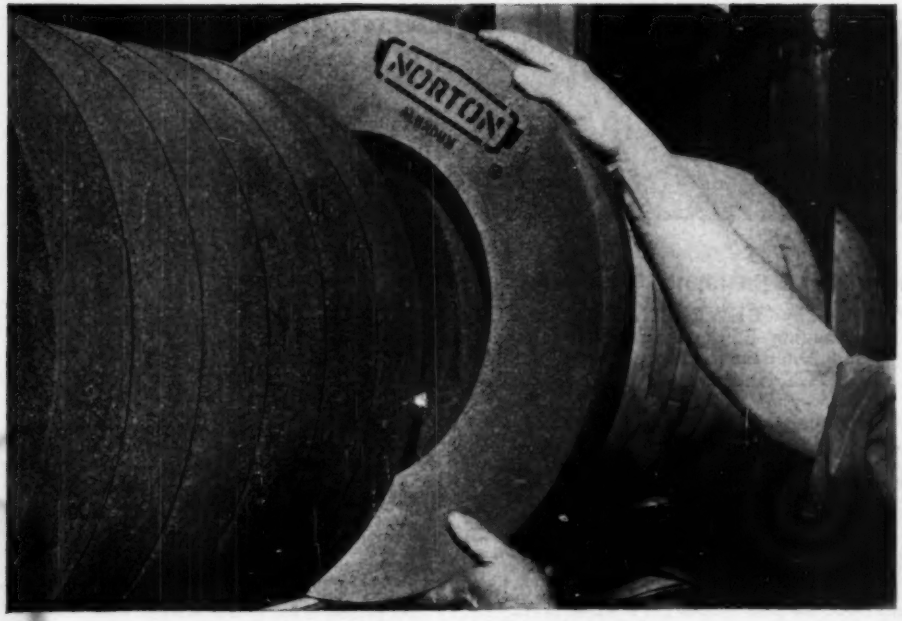
BUSINESS STATISTICS, New Third Edition

By JOHN R. RIGGLEMAN, Consulting Economist and Statistician; and IRA N. FRISBEE, Professor of Accounting, University of California at Los Angeles. February, 1951. 818 pages, $5.50

This book has been revised and expanded to bring it in line with the current business needs that have arisen in connection with present-day industrial, trade, economic, labor, political, and other developments. The point of view throughout this new third edition is that of the business man, who judges the value of statistics according to their usefulness in securing practical results.

The book has been expanded particularly with regard to machine tabulation, business cycles, business forecasting, and marketing analysis, and new chapters have been added on planning and organizing statistical work, applied sampling, and quality control. The illustrative material has been brought up to date where feasible, and new illustrations have been added where necessary.

McGRAW-HILL Book Co. 330 West 42nd Street, New York 18, N. Y., U.S.A.



Select Your Cylindrical Grinding Wheels This Easy Way!

Selecting the right wheel for any cylindrical grinding job is not as complicated as it might appear at first.

A booklet published by Norton Company quickly shows you how to base your selection on such factors as: the material to be ground, the amount of stock to be removed, the tolerances required, the degree of finish, the work diameter and the condition of your machine.

With that information as a guide you can easily select the right Norton ALUNDUM* or CRYSTOLON* wheel from a convenient table of recommendations. You can be sure that the Norton ALUNDUM or CRYSTOLON wheel you select will be exceptionally uniform, well balanced, free-cutting and long-lasting.

To get your free copy of this helpful booklet, ask your nearby Norton representative for Form 2006, or write us direct.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries.

NORTON
TRADE MARK REG. U. S. PAT. OFF.

Making better products to make other products better

Abrasives • Grinding Wheels • Oilstones • Grinding & Lapping Machines • Labeling Machines
Pulpstones • Non-Slip Flooring • Refractories • Ceramic Surface Plates • Boron Carbide Products

NORTON COMPANY • WORCESTER 6, MASS., U. S. A.

NORTON ABRASIVES

Norton Company of Canada, Ltd., Hamilton, Ontario, Canada • Norton Grinding Wheel Co., Ltd., Welwyn Garden City, England
Compagnie des Meules Norton, La Courneuve, France • Deutsche Norton Gesellschaft, m.b.h., Wesseling bez Cologne, Germany
Mole Norton, S.p.A., Corsico (Milano), Italy • Australian Abrasives Pty., Ltd., Auburn, New South Wales, Australia
Norton Abrasives S.A. (Pty.) Ltd., Isando, Transvaal, Union of So. Africa

Here's a single-feeder substation delivered in *One Compact Unit*

Delivered in one shipment from one supplier, a Westinghouse "CSP"® Power Transformer is the quickest, easiest, most economical method of setting up a complete single-feeder substation. These units perform all the functions of a single-feeder substation—complete lightning, surge and fault protection; automatic voltage regulation, load switching and metering. They are compact and easy to landscape.

Better, More Economical Operation

In urban . . . suburban . . . industrial and rural areas—Westinghouse "CSP" Transformers assure better operation through 3-way protection: against lightning and impulse voltages, system short circuits and dangerous overloads. Metal enclosed construction also eliminates service interruption from various external causes. Costs of maintaining "CSP" Units are less than for any other single-circuit substation.

For information about Westinghouse "CSP" Power Transformers write for free copy of Booklet B-4692.

YOU CAN BE **SURE** IF IT'S

Westinghouse

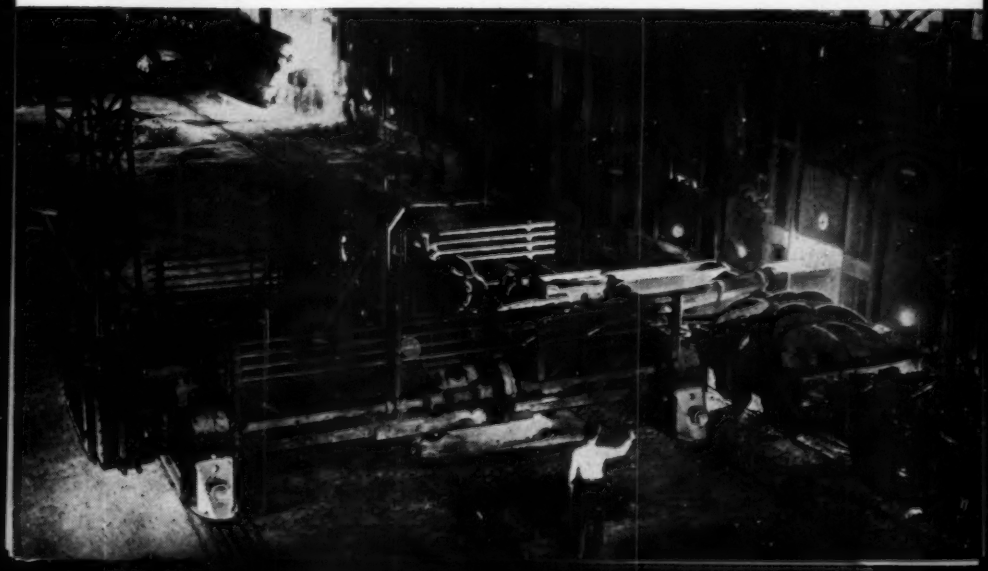
WESTINGHOUSE ELECTRIC INTERNATIONAL COMPANY

40 Wall Street, New York 5, U. S. A.

Bethlehem Steel...

Known Around the World for Dependability and Quality

BETHLEHEM today enjoys a world-wide reputation for steel products of high quality, absolute uniformity and time-tested dependability. Complete *integration* of its coast-to-coast organization of steel-making units, strongly centralized production control, modern methods and techniques, and unique shipping advantages enable Bethlehem to make prompt delivery of steel products to meet all your requirements with the utmost satisfaction to you. Bethlehem Steel Export Corporation, 25 Broadway, New York 4, U.S.A. Cable address: "BETHLEHEM, NEWYORK." *Offices and representatives in all principal cities of the world.*

BETHLEHEM STEEL

Bethlehem's great Sparrows Point plant in the Port of Baltimore is the only steel-producing plant in the U. S. A. located on tidewater. Products for export can be loaded at this plant directly aboard steamers, thereby minimizing possible damage due to additional handling.